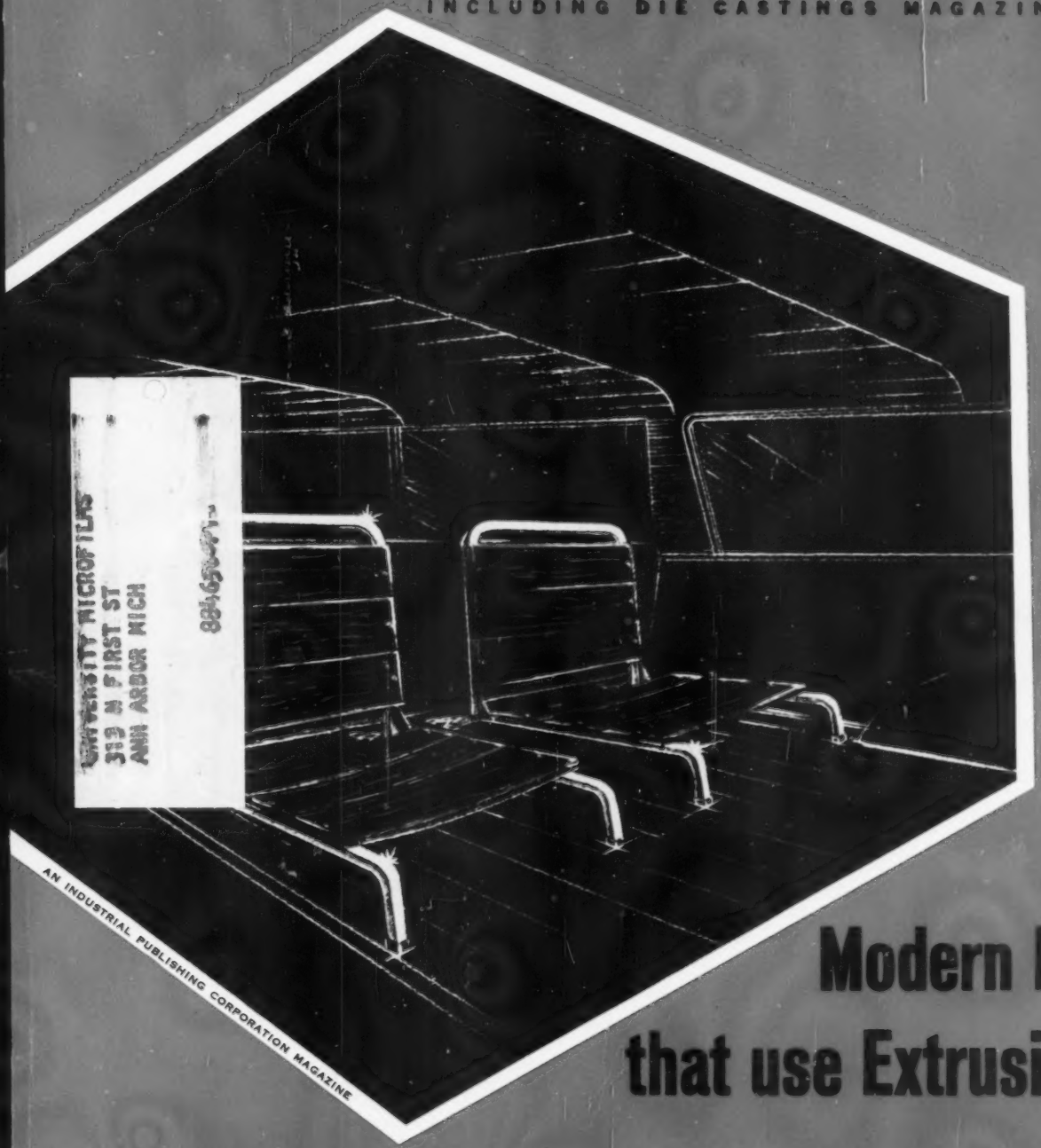
DECEMBER 1961

Precision Metal Molding

INCLUDING DIE CASTINGS MAGAZINE



UNIVERSITY MICROFILMS
313 N FIRST ST
ANN ARBOR MICH

AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

Modern Designs that use Extrusions

PMM design finishing & use of: Die Castings • Extrusions • Investment Castings • Permanent Mold Castings • Plaster Mold Castings • Powder Metallurgy Parts

QUALITY CONTROL, STREAMLINED PRODUCTION METHODS . . .

. . . INSURE YOU UNIFORM QUALITY METAL, FREE FROM IMPURITIES AND GAS.

The most modern production equipment and methods in use, exacting scientific laboratory testing equipment, old-fashioned know-how . . . these are factors that are synonymous with Aluminum Smelting & Refining Company.

Only with the use of consistently perfect raw material can you be assured of a consistently perfect product and minimum scrap loss. Aluminum Smelting helps you maintain that assurance. In fact, each melt produced by Aluminum Smelting bears a certified analysis — your protection of quality.

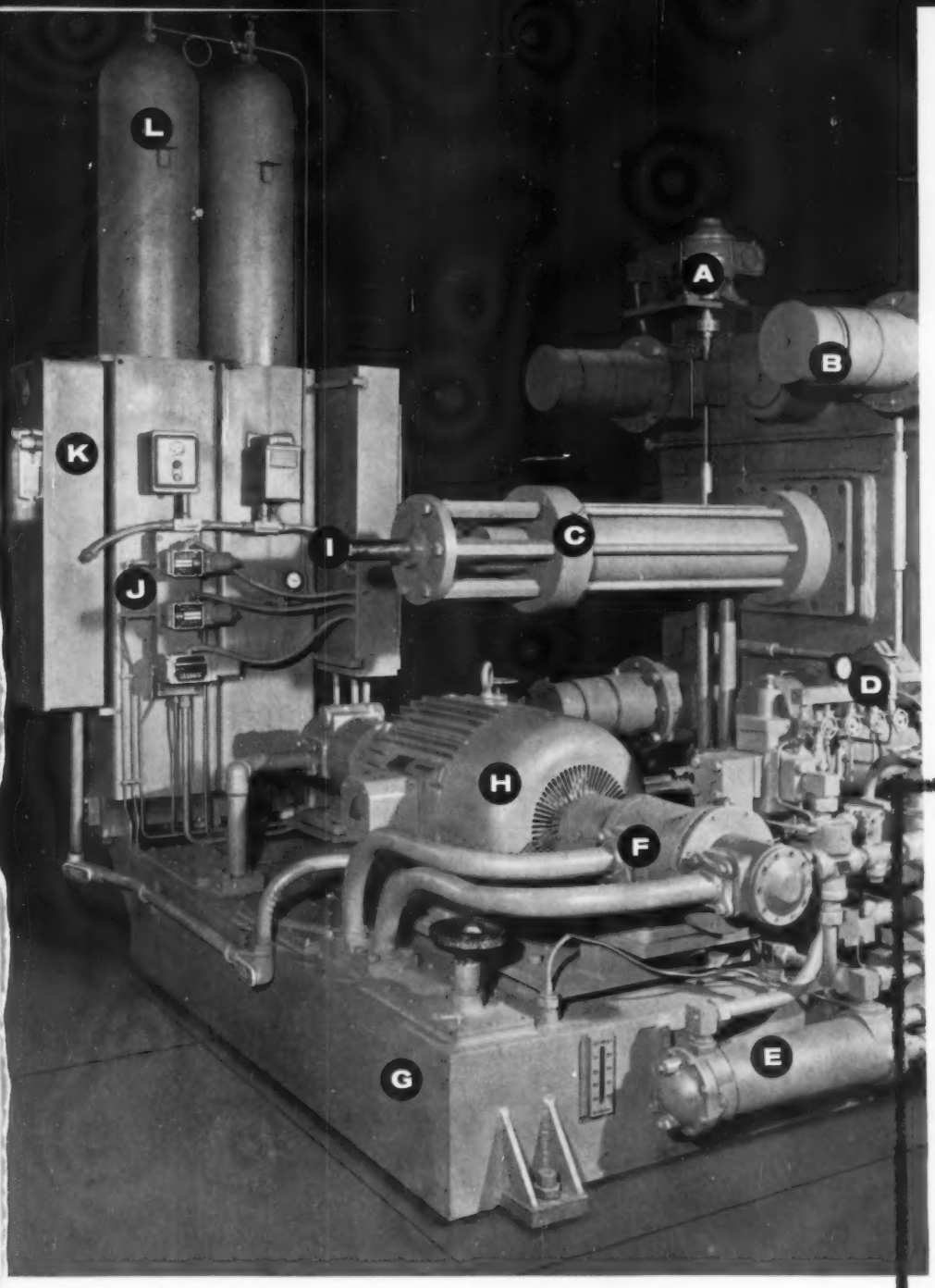
QUICK, DEPENDABLE DELIVERY — ALL SHIPMENTS PALLETIZED

ASR

ALUMINUM SMELTING AND REFINING CO., INC.

MAPLE HEIGHTS, OHIO — TELEPHONE CLEVELAND — MONTROSE 2-3100
DETROIT, MICHIGAN — P O BOX 4014 — TELEPHONE VERMONT 7-3350
INDIANAPOLIS, INDIANA — 3737 N MERIDIAN — WALNUT 5-9259

Circle No. 6 on Reader Service Card



Cast-Master has the "how-to"

the hydraulic power system that adapts to the need

- **A** Switch near operator simplifies motor-drive die height adjustment
- **B** Telescopic metal covers protect tie bars
- **C** Simple die opening cushion adjustment
- **D** Convenient valves manifolded for checking line pressures
- **E** High efficiency heat exchanger
- **F** High capacity pumps for fast cycling
- **G** King size reservoir
- **H** Totally enclosed fan-cooled electric motor
- **I** Simple die-stroke adjustment
- **J** Minimum piping — subplate mounted valves
- **K** Compact electrical control panel
- **L** Large capacity, approved type accumulators

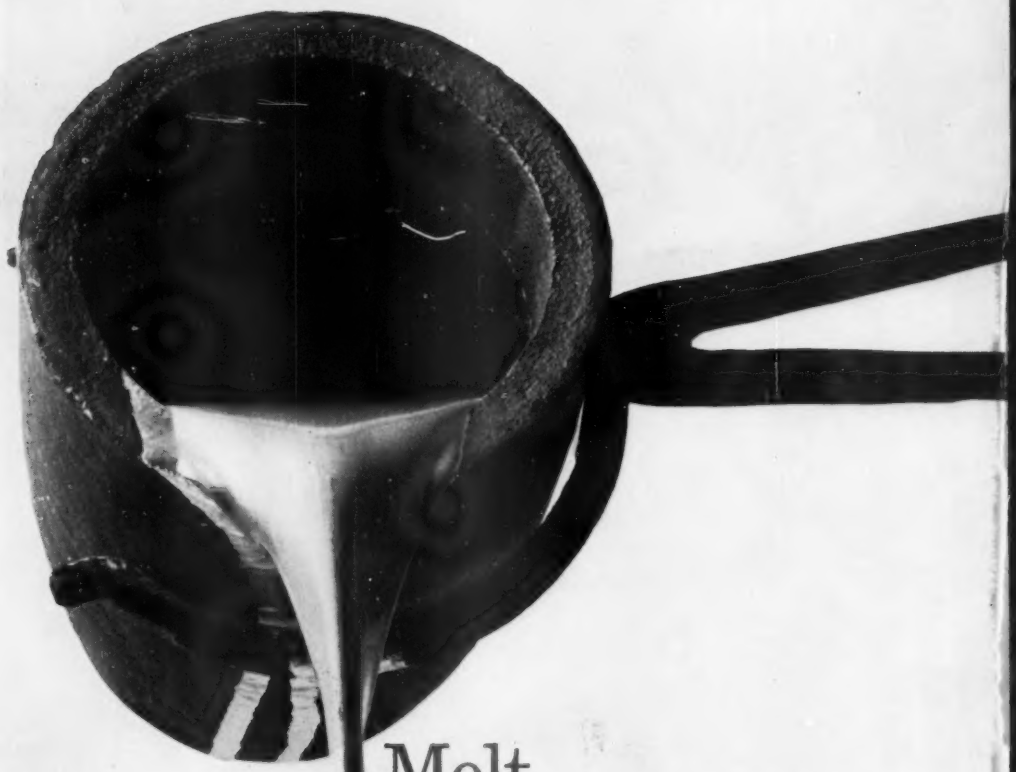
H230

Time won't obsolete your Cast-Master die casting machine. It's designed to meet your needs — today and tomorrow. The hydraulic system, for example, has built-in versatility — is compact, easily adjustable for varying requirements, and accessible. It can be designed for either hot or cold chamber die casting needs, with all controls for day to day adjustments within easy reach of the operator. Look at the features of this 1000-ton die locking Cast-Master.

HPM **CAST-MASTER**

H-P-M DIVISION KOEHRING COMPANY
MOUNT GILEAD, OHIO, U.S.A.

Circle No. 33 on Reader Service Card



Melt aluminum?

Call Olin!

Whether you melt aluminum in 10-lb. lots or by the carload you have access to Olin's casting specialists for information on the latest in improved casting techniques and help in creating the best alloys for your specific purpose. Along with the industry's top brains, Olin Aluminum offers you the industry's top ingots – in 1000-lb. sizes down to the exclusive 10-lb'er. Easily handled and specially adapted for close quantity control these fine-grain ingots are quickly available from mill supply and in less-than-truckload quantities from your nearest Olin Distributor. Whether you want aluminum thinking – or aluminum castings – all you need know is the local Olin phone number.

Olin
ALUMINUM
400 PARK AVE., NEW YORK 22, NEW YORK

PMM December, 1961: Volume 19 Number 12

Precision Metal Molding

FEATURE ARTICLES

25 **THEY'RE DESIGNING NEW PRODUCTS TO USE ALUMINUM EXTRUSIONS**

A large producer of aluminum shows how designers help create new products or improve old ones.

28 **PROTOTYPE TOOLING FOR POWDERED METAL PARTS**

Prototype powdered metal parts forecast component performance, but avoid costly production tooling.

33 **PROTOTYPE DIE CASTINGS**

Product planners and designers can have small quantities of simulated die castings without the high cost of production tooling.

36 **LIGHT, STRONG FISHING TACKLE**

Eight die castings are used in a rod handle and reel that must stand up under rough treatment.

38 **PERMANENT MOLD CASTING EXCEEDS STRENGTH REQUIREMENTS**

An aluminum casting meets Douglas Aircraft's requirements for a structural component in the Nike Hercules missile.

41 **RAIN FOR RENT**

A producer of irrigation sprinkler systems uses permanent mold castings for low-cost, quality valves.

44 **SINTERED TUNGSTEN ALLOY FOR HIGH DENSITY APPLICATION**

High density is an important design requirement for the motor rim in a guidance system gyroscope.

FINISHING SECTION

47 **HARDCOAT MAKES ALUMINUM HARD AS GLASS**

A dense, hard form of aluminum oxide applied to aluminum makes it shrug off corrosion and resist wear.

DEPARTMENTS

6 Letters
9 Industry News
14 Casting About
21 New Products
57 Data in Ads
59 Useful Literature
69 Opportunities
71 Books

DISTILLED WRITING

Published monthly, copyright 1961 by THE INDUSTRIAL PUBLISHING CORP.

Circle No. 45

To make the BEST...

Begin with the

BEST CASTINGS!

Latrobe Die Casting Co

Aluminum Alloy Castings

Zinc Alloy Castings

Tin and Lead Alloy Castings

DISTRICT OFFICES

AKRON, OHIO
E. G. Siess, Jr.
227 W. Exchange St.
Tel: Portage 2-7663

CLEVELAND, OHIO
William Kranz
20001 West Lake Road
Tel: Edison 1-6888

DAYTON, OHIO
J. M. Gallaher
333 W. First St.
Tel: Baldwin 6-3418

DETROIT, MICHIGAN
Jay K. Esler
1016 Fisher Bldg.
Tel: Trinity 3-5910

NEW ENGLAND
R. L. Thompson
P.O. Box 77
Old Saybrook, Conn.
Tel: Evergreen 8-9833

PHILADELPHIA, PA.
Albert B. Reid
505 Wadsworth St.
Tel: Chestnut Hill 7-8833

Latrobe Die Casting Co.
Latrobe, Pennsylvania

Established 1918

Circle No. 36 on Reader Service Card

Precision Metal Molding

STAFF

David W. Veit ..... *publishing director*
Philip R. Kalischer ..... *editor*
Ronald Khol ..... *associate editor*
Thomas S. Palmer, Jr. ... *assistant editor*
Scholer Bangs ..... *western editor*
672 So. Lafayette Park Pl.
Los Angeles 57, California
Henry Lefer ..... *eastern editor*
Rm. 835, 60 E. 42 St.
New York 17, N. Y.
H. K. Barton ..... *foreign editor*
Hiram Barton Associates
Roughfield, Etchingham
Sussex, England
Bert Benkendorf ..... *art editor*
Mary A. Cindrich .... *editorial assistant*

SERVICE DEPARTMENTS

Alaric Mausser ..... *art director*
N. G. Kiser ..... *circulation manager*
Robert Gauvin *Mgr. reader service dept.*

SALES OFFICES

Cleveland 15
812 Huron Rd., SU 1-9620
ROBERT SIMMONS

New York City 17
Rm. 835, 60 E. 42 St., MU 7-3420
LEE HAAS, *manager*
ARTHUR L. GOEBEL

Chicago 11
Rm. 704, 520 N. Michigan,
WH 3-1655
CHARLES F. GEYER, *manager*
KENNETH L. JONES

Los Angeles 57
672 S. Lafayette Park Pl.,
DU 7-5104
ALAN T. CAZIER, *manager*
LLOYD BROOKMYER

London, S.W. 1, England
36 Victoria Street,
Sullivan 6072
JOHN A. LANKESTER, *manager*

SUBSCRIPTIONS in U.S. and possessions: $7 1 year; $12, 2 years. Canada: $8.50 per year. Foreign: $10 per year, payable in advance in U.S. funds. U.K.: £ 3.5.0 per year payable in Sterling to London office. Single copies when available: 1 to 10 — 75¢ each; 11 to 25 60¢ each; over 25 45¢ each.

Out of print copies of PRECISION METAL MOLDING are available in complete volumes as positive microfilm copies from University Microfilms, 313 N. First St., Ann Arbor, Mich.

published monthly by
The INDUSTRIAL PUBLISHING CORPORATION
812 Huron Rd., Cleveland 15, Ohio

LESTER P. AURBACH ..... *president*
EDWIN M. JOSEPH ..... *executive v. p.*
PAUL ROLNICK ..... *vice president*
N. N. GOODMAN, Jr. ... *vice president*
LEE HAAS ..... *vice president*
CHARLES F. GEYER ..... *vice president*
THOMAS L. DEMPSEY .. *asst. sect.-treas.*

AFFILIATED PUBLICATIONS: Hydraulics & Pneumatics, The Refrigeration & Airconditioning Business, Material Handling Engineering, Handling & Shipping, Modern Office Procedures, Occupational Hazards, Power Transmission Design, Welding Design & Fabrication. Member BPA.

Controlled circulation postage paid at St. Joseph, Michigan. Not responsible for unsolicited editorial material. Printed in the U.S.A.

Please return Forms 3579 to 812 Huron Rd., Cleveland 15, Ohio.

Versatility and low cost make Zinc superior metal for die casting

Versatility and low cost are two key reasons for die casting with zinc. Characteristics like good dimensional stability, close casting tolerances, high strength-to-weight ratio, excellent finish, point up the metal's versatility. Initially a low cost metal, zinc's low melting point makes possible further cost savings with longer die life and faster press operation. In addition, smooth "as cast" surfaces mean minimum finishing cost.

BUY TADANAC

TADANAC SHG MADE IN CANADA

SPECIAL HIGH GRADE ZINC

TADANAC Brand Special High Grade Zinc, electrolytically refined under carefully controlled conditions, has the overall purity and the low individual impurity content (determined spectrographically) to ensure it is completely satisfactory for die cast alloy manufacture.

DELIVERY – UNIFORMITY – SERVICE

From a single refinery Cominco produces over 500 tons of zinc a day. This assures our customers consistent, prompt delivery of metal of uniform high quality.

Our Technical Service is ready at all times to assist you to use TADANAC zinc to your best advantage.

TADANAC SHG *FOR DIE CAST QUALITY*

COMINCO

THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED, MONTREAL

Tadanac Brand Metals are sold in United States by American Metal Climax, Inc., New York, Chicago, Detroit, Los Angeles

Circle No. 20 on Reader Service Card

THE FREEDOM OF DIMENSION

. . . saves 35 machining operations

This target revolver barrel is now being made by the new Hitchiner Ceramic Shell technique of investment casting. *Thirty-five* machining operations are eliminated! The only external finishing required is partial polishing.

Investment casting may provide many benefits for you . . . choice of alloy . . . flexibility of design . . . improved parts performance . . . reduction of costs. Maybe one of your parts can be made better for less.

Write for complete technical and facilities information.

HITCHINER
Milford 3, New Hampshire

Circle No. 30 on Reader Service Card

PMM letters

the readers' forum

ERRATUM

In the November issue of PRECISION METAL MOLDING, page 87, the introduction to the listing of local representatives should have read ". . . representatives of major custom fabricators who have advertised in PMM during the past 12 months." The omission of the complete explanation could have led to some misunderstanding.

Die Design

Please send any information available on die cast die designing, impact extrusion die designing, powdered metal die designing, or tell me where I may purchase books relating to these subjects. —R.E.K.
Tool Design Engineer

We can recommend two books. One is Tooling for Metal Powdered Parts, published by the McGraw-Hill Book Co. The other is Molds for Plastics, published by Temple Press Ltd. in England. The latter should be of some value since the design problems are similar for injection molded plastics and die castings.

Industry Information

I am a student at the Stanford Graduate School of Business working on a Master's Degree project on the die casting industry. The enclosed outline shows the general scope of our study, which covers mostly the business and production aspects of die casting.

We would appreciate any literature on the topics outlined and any information you could provide relative to society meetings, shows, or recommended plant visits.—M.J.R.

We suggest you review the September '60 and '61 issues of PMM. Both carry statistical information on the die casting industry. These issues are probably available through one of your local libraries.

For further information along the lines of your interest, we refer you to Mr. David Laine, Secretary of the American Die Casting Institute, 366 Madison Ave., New York 17.

HARDENED STEEL DIE CASTING PLUNGER RINGS by AUTO DIESEL

1" dia. x ⅛" and up

Cut die cast production costs—reduce downtime with rings made by the world's quality ring manufacturer. The hardened steel ring illustrated is resistant to heat and abrasion. Other Auto Diesel products custom manufactured to your specific requirements.

1. Rings of all materials for industrial purposes.
2. Plungers for zinc.
3. Plunger tips and rings for aluminum.

Try it Today . . . . You'll Standardize Tomorrow

THE AUTO-DIESEL PISTON RING CO.
3141 Superior Avenue • Cleveland 14, Ohio

Circle No. 13 on Reader Service Card

CASE HISTORIES FROM
MT. VERNON FILES

Who makes the die castings for the FABULOUS NEW IBM SELECTRIC?... MT. VERNON

This truly revolutionary IBM SELECTRIC typewriter is probably the most important breakthrough in office technology since the invention of the typewriter itself.

It is a brilliant example of engineering, workmanship and the imaginative use of materials and processes. Contributing to the beautiful appearance — and much lighter overall weight — are the 3 Mt. Vernon aluminum die castings that comprise the housing. They weigh only 5½ lbs.

As with IBM to whom Mt. Vernon has been a reliable supplier for several years, we also offer you our fourfold services and coordinated facilities for precision zinc and aluminum die castings.

1958 1959

We may be the "reliable supplier" you need to help you improve your products. Why not get in touch with us and talk it over? Our field salesmen are waiting for your call.

MT. VERNON DIE CASTING CORPORATION

Stamford, Connecticut

FIELD SALESMEN—BALTIMORE, MD.: Mr. C. M. Gordan, 919 St. Paul St. • **BROOKLYN, N. Y.:** Mr. Robert V. Moore, 2317 Plumb 2nd St. • **MARIETTA, N. Y.:** Mr. Burt J. Meldrum, Olanco Road • **PITTSBURGH, PA.:** Mr. Andrew W. Anderson, 300 Pasadena Drive So. • **STAMFORD, CONN.:** Mr. Anker Anderson, Cascade Road • **VALLEY FORGE, PA.:** Mr. G. T. McMaster, P. O. Box 115

Circle No. **42** on Reader Service Card

V-R INVESTMENT CASTINGS

Parts shown
actual size

in metals that meet your specific needs

- Resist abrasion
- Resist corrosion
- Resist temperature extremes
- Withstand shock
- Non-magnetic

Do your small parts require any of these characteristics? V-R Investment Castings in alloys such as Tantung, cobalt and nickel base metals, stainless steels, beryllium coppers and copper base or silicon bronzes are readily available. Other alloys, with specific physicals, can be developed and cast to meet your requirements. Irregular shapes, unusual contours and exacting detail on internal and external surfaces are accurately and economically produced. V-R Investment Castings are the practical answer to many of your small parts designing problems. Write for complete information today.
VASCOLOY-RAMET CORPORATION,
876 Market Street, Waukegan, Illinois.

The outstanding properties of Tantung are also available in larger parts produced by other casting methods.

V-R FIRST CHOICE of more and more designers

I-850

Circle No. 56 on Reader Service Card

PMM

news of industry & associations *activities of people, companies & groups in the precision metal molding industries*

promotions & changes

Hoeganaes Sponge Iron Corp.—*Ross R. Holmes* has been appointed as general sales manager. He joined the firm in 1959, and was chief metallurgist prior to his promotion.

Gries Reproducer Corp.—*John A. Morrison, Jr.* has been appointed as field sales engineer. He will function as technical liaison between GRC and its field representatives.

High Vacuum Equipment Corp.—*William B. White* has been elected vice president, administration. He was formerly sales administrator for the firm. His new duties include over-all administration in sales, engineering, customer and vendor relationships, and plant liaison.

Mallory Metallurgical Co.—*Max Hutton* has been promoted to staff engineer. He will be responsible for special engineering projects, and liaison between engineers and customers.

U. N. Alloy Steel Corp.—*Richard Miller* has been appointed midwestern representative, handling Bohler Tool Steels. He is president of Tool Service, Inc.

Maas & Waldstein Co.—*Robert B. Stevens* has been named manager of the Midwestern Division. His headquarters will be at the Chicago plant, and he will be responsible for sales and service throughout the division.

Hevi-Duty Electric Co.—*Roger L. Hosfield* has been appointed product manager of the Oven Division. He was formerly with Grieve-Hendry Co., Inc.

more on page 51

Lester ships 1600-ton frame-type die casting machine

Lester-Phoenix, Inc. recently shipped what is purported to be the largest frame-type die casting machine ever produced in this country. The unit was shipped from the firm's Cleveland plant to a leading manufacturer of durable consumer goods.

The machine, which is capable of casting 76 pounds of aluminum, will be used to produce basic aluminum components.

The size of the dies used in this machine is enormous for a unit of its type. To illustrate this, the compact car was driven between the platens for the picture above.

This machine, with 1600 tons of certified clamp, has broad potential in industry for producing giant die castings, such as washing machine barrels, refrigerator doors, and many other such applications.

AWMA and SGD&WI merge

Members of the Aluminum Window Manufacturers Association and the Sliding Glass Door & Window Institute, meeting jointly at Scottsdale, Arizona, September 24-28, announced the formation of the Architectural Aluminum Manufacturers Association. More than 200 delegates and guests were present at Mountain Shadows Hotel.

The merger, officially forming the new AAMA, will become effective January 15, 1962 in the Statler-Hilton, Dallas, where bylaws will be ratified and a board of directors and officers elected.

more on page 55

HOLMES

MORRISON

WHITE

HUTTON

MILLER

STEVENS

Which of these parts should be investment cast?

. . . *All* the parts except the milling machine collet at the top right—which is a "natural" for conventional lathe work. Even the helical impeller the men are examining is best made as an investment casting—the helix is undercut in such a way that no cutting tool could reach inside to remove the metal.

"Naturals" for investment casting are usually parts that are too intricate to be made economically by any other process, or involve alloys or quantities that make them impractical to produce by other methods. In other words, when it looks as if you might have to sacrifice a design because its complexity makes the cost prohibitive, or forego a preferred alloy because it is difficult to machine, then it's time to take a long, hard look at investment casting.

But . . . it's not always as easy as it sounds to spot the parts that are "made" for investment casting. That's where the Arwood sales engineer comes in. He knows Arwood expects him to show a customer how to get the most from the process. To help keep your cost down he may have to suggest a filleted radius here . . . or a tolerance opened up there. Then too, on occasion he may readily have to admit the part should not be investment cast at all. However, he also knows that if you just can't have the part made any other way, Arwood will go all the way down the line to have it investment cast for you.

Our five plants cast every castable metal and alloy, including magnesium and superalloys. Each has its own research, tooling, quality control and production facilities. In short, if it can be investment cast, we can investment cast it.

LIKE TO LEARN MORE ABOUT INVESTMENT CASTING?

Write us for a complimentary copy of our 44-page manual, "Practical Guide to Investment Casting." Among other sections it includes practical tips on designing for investment casting, as well as analyses and physical and mechanical properties of all the metals and alloys cast by Arwood.

Machine the simple . . . cast the complex

A complete service from design through tooling, production and finish machining. Seventy-one engineering representatives from coast to coast.

arwood

ARWOOD CORPORATION • 323 West 44th Street, New York 36, New York

PLANTS IN BROOKLYN, N. Y.; TILTON, N. H.; GROTON, CONN.; LOS ANGELES AND LA VERNE, CALIF.

Circle No. 11 on Reader Service Card

ASARCO ZINC DIE CAST ALLOYS

For Trouble-Free Die Casting

Specify Asarco Zinc Alloy

When the job calls for zinc die castings to meet high standards of product quality, use Asarco zinc die cast metal. It is made from Special High Grade Zinc, 99.99+% pure, the world's purest metal produced in large tonnages. Its purity and uniformity, unsurpassed anywhere, are assured by Asarco-developed electrolytic refining processes and by completely controlled alloying techniques. Asarco Zinc Die Cast Alloys numbers 3, 5 and 7, sold by the Federated Metals Division, are ready for immediate shipment from stock in seven convenient supply centers across the country. With Asarco Zinc die casting alloys you get low material cost, superior impact strength and castability, minimum machining and finishing time, reduced production time and cost, shorter casting time, low temperature casting, smoothest casting surfaces, brilliant and lasting finishes.

For complete information, write or call Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N.Y., or your nearest Federated sales office.

ASARCO

Circle No. 7 on Reader Service Card

How Wheeling Steel bought safety... gained efficiency with Cellulube 300

Mr. Kenneth N. Bundy, Superintendent of Utilities Department, Steubenville Works, Wheeling Steel Corporation is responsible for the safe and efficient operation of power house equipment. Air compressor lubricant is fire-resistant Cellulube 300.

Two of three 100 psi. air compressors in power house at Wheeling Steel. Not a single air-compressor fire has occurred at this installation since Celanese fire-resistant Cellulube 300 has been used as the lubricant.

Compressor fires were troublesome before Celanese Cellulube was used in three dual stage, 100 psi. air compressors in the power house of Wheeling Steel's Steubenville Works.

To stop this fire problem, Celanese recommended Cellulube 300. And, since use of this fire-resistant fluid was initiated more than five years ago, there has not been a single fire in any of the compressors! What's more, substantial savings have been gained through reduction in maintenance.

Celanese Cellulubes, available in six controlled viscosities, prevent build-up of hard car-

bon deposits. Cleaner operation eliminates the need for cleaning compressor auxiliaries and greatly reduces frequency of valve cleaning.

Cellulubes give overall protection against wear comparable to that of premium petroleum oils.

Doesn't it make sense to investigate what fire-resistant Cellulubes can do for you in terms of both safety and efficiency? The coupon will bring you complete details. Celanese Chemical Company, 522 Fifth Avenue, New York 36, N. Y.

Celanese® Cellulube®

Celanese Chemical Company is a Division of Celanese Corporation of America
Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver
Export Sales: Amcel Co. Inc., and Pan Amcel Co., Inc., 522 Fifth Avenue, New York 36

Celanese
CHEMICAL COMPANY

CELANESE CHEMICAL COMPANY
Dept. 589-L 522 Fifth Avenue, New York 36, N. Y.

Rush data on Cellulubes.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

My application for Cellulubes is_____

_____

Circle No. 18 on Reader Service Card

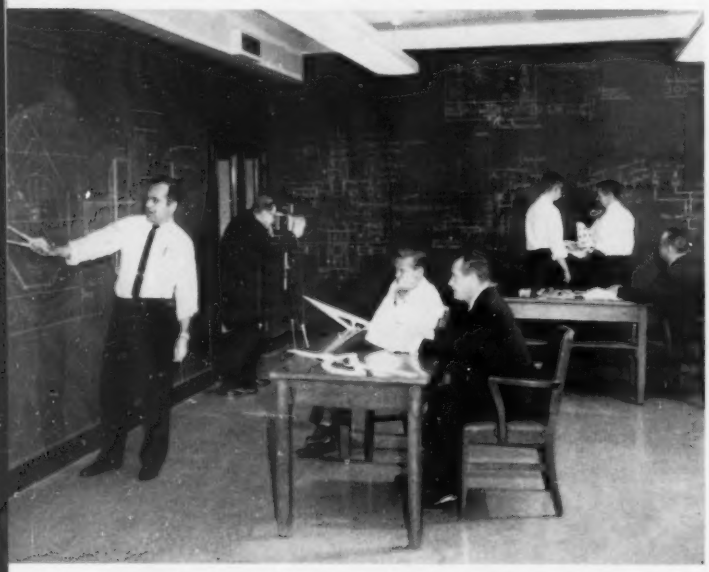
PMM

casting about *technical news of applications & processes involving precision metal molding*

New Design Method Cuts Engineering and Development Costs

A new design method, called the Panoramic Design Technique, does away with drawings made by using conventional drawing boards, parallels, and T-squares. Instead, designers put their ideas directly on blackboards and photograph them.

T A B Engineers, Inc., a Chicago consulting engineering firm, developed the method. They claim the technique cuts engineering, design, and drafting costs from 33 to 50%. Furthermore, they say that if the new method were universally adopted, private industry and the government could slice at least $6 billion from an annual $22 billion engineering, drafting, and research and development expense. In its own use of the method, T A B has cut both cost and time on design projects by about 50%.



On a special packaging machine for a food processor, they estimate it would take six months and $80,000 to engineer and build the machine by conventional methods. Using the Panoramic Design Technique, the completed machine was delivered in 90 days at a cost of $48,000.

In using the method, a team of designers complete a design on the blackboard. Then a detailed drawing is made using a plastic overlay on which the designers sketch other views and add dimensions. Instead of transferring this work to a drawing board, photographs are taken.

The developers of the method point out one important advantage of the blackboard technique that some designers may not want to acknowledge: It forces them to work. It's hard to tell if a man at a drawing board or desk is studying a design, daydreaming, or sleeping. He may puzzle over an idea for days before lifting a pencil. But he can't be idle at the blackboard. If he stands still, others will notice and they'll pitch in to help him.

The requirements for the technique are wall size blackboards, drawing instruments for blackboard use, and photographic equipment.

New Steel Casting Alloys Close Performance Gap

The Kolcast Division of Thompson Ramo Wooldridge Inc. has announced that it has developed new steel alloys which close the performance gap between stainless steel and many of the super alloys. Kolcast calls the alloy group SR and is currently producing investment castings in the new material.

The SR alloys maintain usable strengths up to 1600°F. Most stainless steels hold their strengths only up to 1000°F. Cast SR steels have tensile strengths at room temperature as high as 120,000 psi and yield strengths up to 105,000 psi. Stress-to-rupture properties exceed those of stainless steels and approach those of super alloys.

The SR alloys have shown excellent corrosion resistance to sulphuric acid, sea water, and most other acids and corrosive materials. This makes them suited for applications in chemical plants, refineries, food processing plants, and marine products. They also are expected to be used widely for high temperature applications.

The SR alloys are austinetic, non-magnetic, and age-hardenable. Kolcast officials say that an important consideration is the fact that SR alloys are basically steel and do not rely on critical and high priced metals such as cobalt, columbium, titanium, or zirconium. They contain even less nickel than other alloys.

Foundries wishing to produce castings in SR alloys may obtain licensing agreements by contacting the Kolcast Division.

more on page 53

HERE'S WHY...

POTOMAC® M IS THE FASTEST GROWING DIE STEEL IN THE DIE CASTING INDUSTRY

- ***Product Quality*** —the characteristics and properties you require in a die block . . . the machinability, stability, response to heat treatment . . . the *right* grade for your job.
- ***Facilities*** —unmatched, by anyone, anywhere . . . production equipment specifically designed for the job at hand.
- ***Availability*** —stock on the shelf, finished and ready for you . . . and job-shop delivery schedules, the industry's most dependable.

3702-1

PRODUCT QUALITY through...

Die quality clear to the center . . . upset forging quality . . . and in pressed billet stock! That's what puts Potomac M . . . A-L's H-13 Die Steel . . . in a class by itself. And *that's* the kind of quality that's absolutely mandatory for the intricate interior patterns in today's complex diecasting dies.

Quality like this has been associated with Allegheny Ludlum Die Steels over the past 20 years, during a period when die blocks were generally running less than 1200 pounds. Holding rigid specifications on ultrasonic soundness, grain size, and response to heat treatment in blocks of this size was one thing. Offering consistently higher quality in much larger die blocks . . . more and more the rule these days . . . is something else again.

But, Allegheny Ludlum has become *the* specialist in doing just that . . . in providing these massive chunks of steel with the same center quality, machinability, and mechanical properties generally associated with much smaller sections.

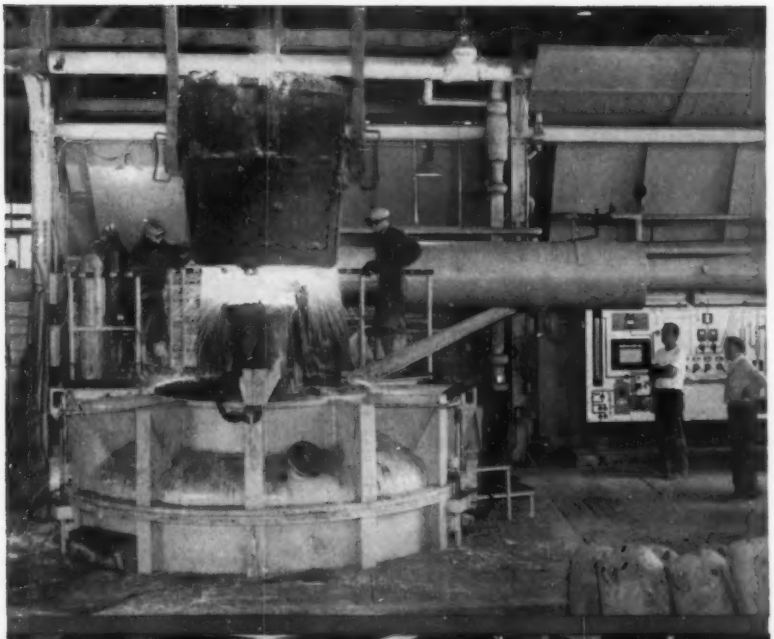
And here's what it means to you

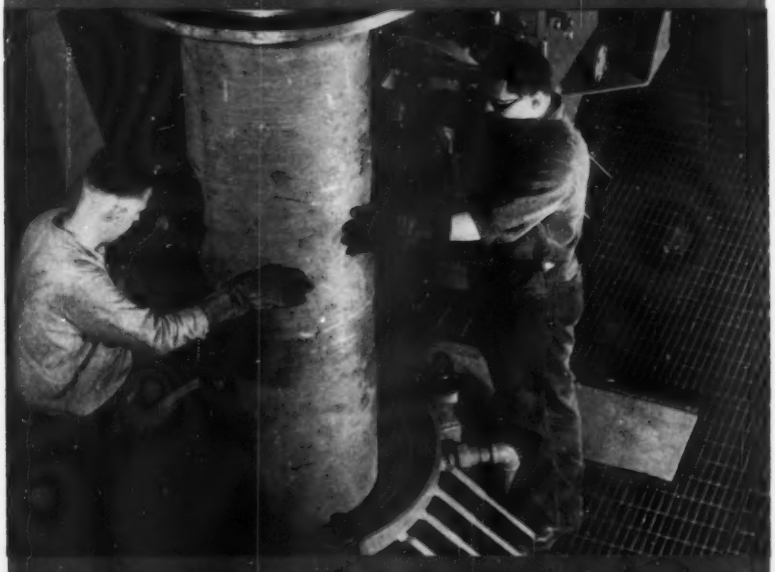
It means that Potomac M dies have greater strength in the transverse direction, and combine the ultimate in toughness with machinability and size stability. It means water cooling channels may be employed without the risk of cracking your dies due to thermal shock. It means better resistance to abrasion and softening at elevated temperatures . . . and, greater resistance to wash and heat checking. Most important, it means Potomac M is specifically created, and specifically processed for you . . . the most practical and useful material for your diecasting needs.

. . . A-L's 2,000 Ton Forging Press

Production equipment specially designed for the job at hand is part of the story. The direct pumping facility and fast, closely controlled action of A-L's unique forging equipment permits greater reductions in area from ingot to billet in a single heating, and results in complete ingot reduction in a relatively short time, with fewer reheats necessary. Coupled with A-L's ability to produce ingots up to 40″, of superior quality as-cast, the capacity of this press to rapidly and *completely* work such ingot grain structure inevitably results in an exceptionally high center quality in the billet, together with a refined grain structure more responsive to heat treatment. Substantially improved mechanical properties are obtained in the forged die blocks, with particular improvement in transverse tensile strength and ductility.

3702-2





...A-L's Vacuum Degassing

Potomac M Die Steel is vacuum degassed . . . as a matter of routine. Vacuum degassing results in a cleaner steel, without blemishes or subsurface discontinuities . . . those imperfections which often reveal themselves in the die only after considerable machining has been done. Vacuum degassing produces a steel with lower oxygen and hydrogen content, with greatly reduced tendency toward microcrack formation, with fewer nonmetallic inclusions . . . a steel with better, more reliable mechanical properties clear through.

...A-L's Special Melting

For the unusual die applications requiring the ultimate in cleanliness and center quality, Allegheny Ludlum now offers its Consutrode® Potomac M. For requirements involving a super-finish die, the superior cleanliness of this vacuum melted product assures the die maker of an unblemished working surface clear through the workpiece. Equally important, this vacuum melted steel provides an improved transverse ductility in large die blocks, particularly applicable to dies which require the ultimate in toughness and resistance to thermal shock.

...A-L's Machined Finish

All bars and blocks in the larger sizes are milled to a finish that permits die layout right on the steel we ship. Finished closer to final size, there's much less wasted metal to wind up as chips on the floor of your shop. Allegheny Ludlum Potomac M die blocks are delivered to you free from scale and decarburized surface areas, and ready for your diemakers.

3702-3

AVAILABILITY

Allegheny Ludlum's Potomac M is part of the Steelector Program, a unique system which enables tool steel buyers to select the proper steel on the basis of intended application, and check on the availability of the desired size and shape before any purchase decision is made or any paperwork issued. Individual Data Stock Lists for each Steelector Grade clearly set forth the size and shapes of bars and billets available from stock . . . sizes which will serve the requirements of all users. This is all finished stock . . . over 320,000 pounds of Potomac M . . . on the shelf, ready for you. And, it's backed up by over 180,000 pounds of Potomac M billet stock, ready at the mill for finishing to your specifications, should the size, weight or shape of your order take it out of depot stock category. To learn how you can take advantage of this special stocking plan on tool and die steels, contact your local A-L Representative, and ask him about the Steelector Program and the job-shop availability of special sizes, or write Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

Back-up stocks of ingots and billets insure job-shop delivery schedules on mill shipments. Here, Potomac M billet stocks at the Dunkirk Plant of Allegheny Ludlum await finishing operations.

A corner of an Allegheny Ludlum Warehouse, with part of the finished stocks of large Potomac M die blocks that permit customers to quote on short delivery jobs without expensive inventories.

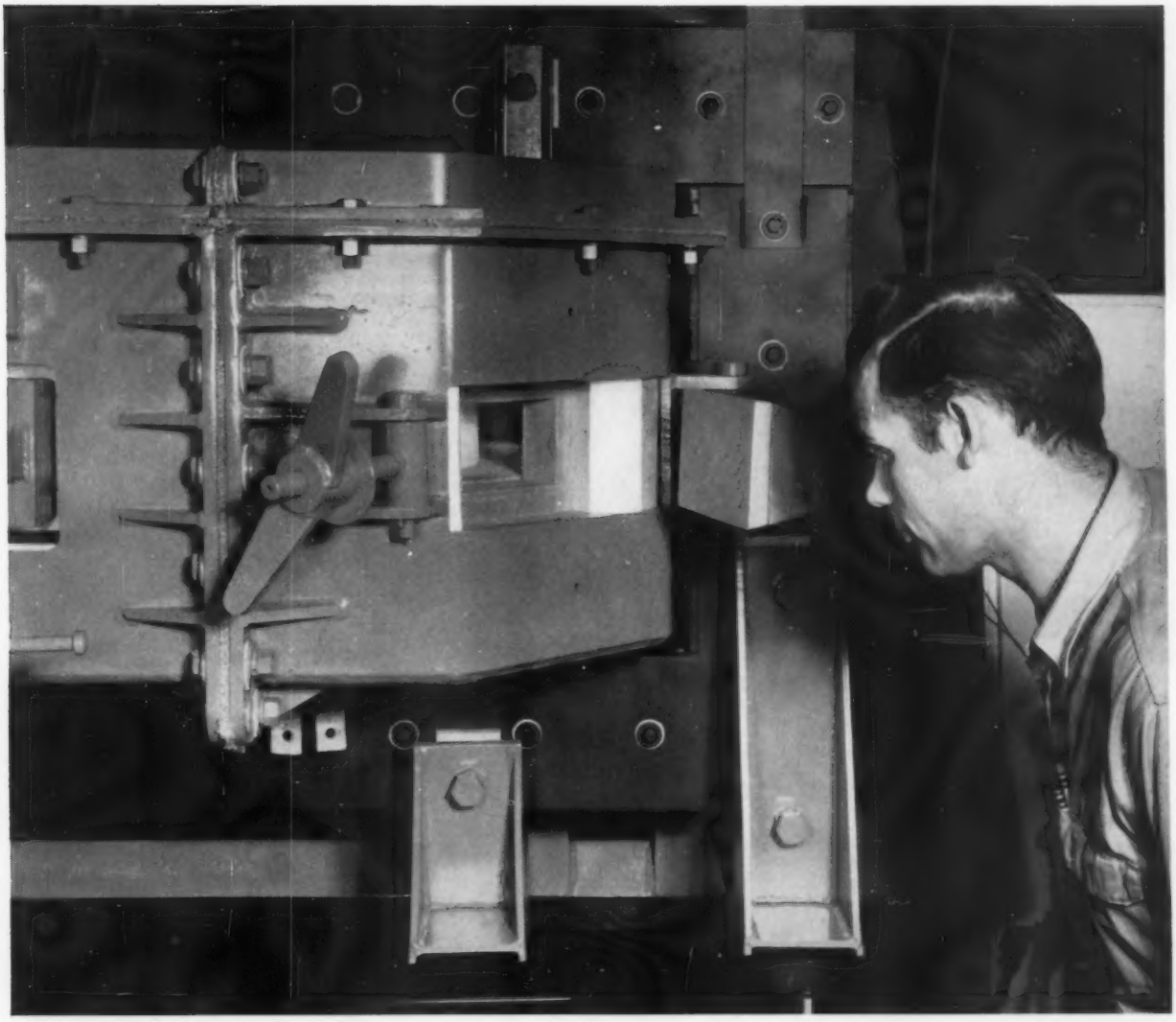
STEELECTOR PROGRAM

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

3702-4

Circle No. 4 on Reader Service Card



with the new Hevi-Duty® 60-cycle nonferrous melter, you can

clean channels in a matter of minutes

. . . *while maintaining a heel of molten metal in the furnace.* You simply tilt the furnace forward, gravity clears the horizontal channels . . . and there you are. Four convenient clean-out doors make inspection a matter of just *looking* in . . . make clean-out simple, fast and complete.

The furnace body is quickly removable for relining. To free it completely from the hydraulic and electrical systems of the furnace, you simply take out a few bolts, remove from the cradle and replace with a spare furnace body. Down time becomes minimal.

Most of all, a Hevi-Duty Tagliaferri 60-cycle nonferrous induction furnace can help you improve metal quality. Controlled, horizontal, stirring action completely homogenizes the melt . . . eliminates turbulence at the metal surface . . . reduces oxidation and gas absorption. This results in fine, tight-grained castings.

Other features: 80% thermal efficiency . . . power factor of 70% to 80%, requiring minimum correction . . . less than 1% melting loss . . . lining life from six months to two years.

And Hevi-Duty supplies the *complete* furnace package — all the necessary controls, instrumentation, electrical and hydraulic systems. Consult your Hevi-Duty sales engineer or write Hevi-Duty Electric Company, Watertown, Wis. Request Bulletin 6052.

H-47-61

HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

BPC

Hevi-Duty Electric Company, Watertown, Wis.

A Division of Basic Products Corporation

Circle No. **29** on Reader Service Card

INTEGRATED PRODUCTION —from Ore to Ingot

Underground scene in American Zinc's East Tennessee zinc mines. More than 50 years' reserve of zinc ore has been developed here.

Assures the Uniformity and Purity of

Cell room in American Zinc's electrolytic zinc plant at Monsanto, Ill. Special high-grade zinc is produced at this modern refinery.

AZCO Zinc Die Cast Alloys

Latest spectrographic analyzing equipment is employed to assure accurate control of alloys at all times.

You set your specification—get your specification with AZCO Zinc Die Cast Alloys. AZCO Alloys are produced from American Zinc special high-grade slab zinc—quality controlled from ore to ingot to assure the purity and uniform analysis you need for trouble-free production. From our Monsanto, Illinois, plant in the center of the "Zinc Zone," you get the fast, dependable service you need to meet your production schedules. Phone for immediate attention.

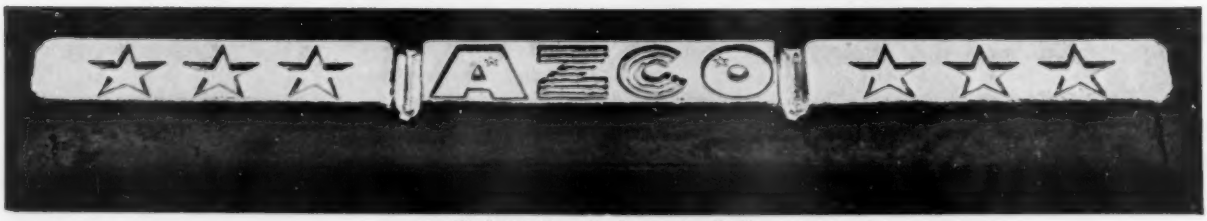
American Zinc sales company

1515 Paul Brown Building, St. Louis 1, Missouri

Distributors for:

AMERICAN ZINC, LEAD AND SMELTING COMPANY

Detroit • Columbus, O. • Chicago • St. Louis • New York



Circle No. 9 on Reader Service Card

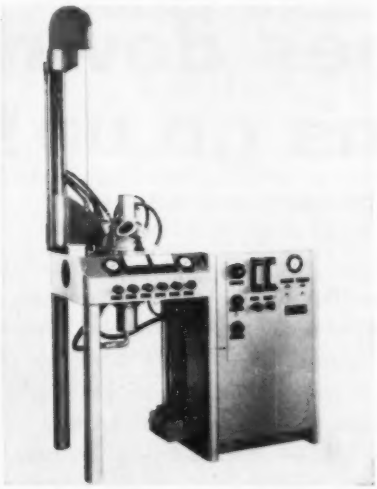
PMM

new products & developments *qualified readers can get complete details on these products. Use the reader service cards.*

Arc melting furnace

HIGH VACUUM EQUIPMENT CORP.—A new line of combination consumable/non-consumable arc melting furnaces is available featuring a Beamatron melting gun which may be furnished for electron bombardment in a vacuum. This is said to be the only means of handling metals requiring extreme purity in processing ingots and buttons without electrode contamination. For use in button or non-consumable melting, a tungsten tip is provided for the electrode holder.

High purity of the non-consumable melted material is obtained



by the use of a water-cooled tungsten electrode and water-cooled copper crucible for the ingots. The consumable electrode equipment can handle a melting electrode 24 inches long and two inches in diameter.

Circle No. **235** on Reader Service Card

High frequency finishing mills

SOUTHWESTERN ENGINEERING CO.—The Vibro-Energy Finishing Mills give three-dimensional, high frequency vibration for high-efficiency deburring and polishing of metal, plastic and ceramic parts. The units feature low initial and maintenance costs as a result of design simplicity, use only the floor space dictated by the size of the container, and require only one adjustment for increasing or decreasing the motion of the parts throughout the media. The units can be used for burnishing operations, and a protective fabric cover is available to close the top when used in conjunction with corrosive compounds.

Circle No. **236** on Reader Service Card

New drill speeder unit made available

TAPMATIC CORP.—Drill Speeder Model #125 is a brand-new addition to a line of units for increasing drill spindle speeds. This unit has a ratio of 6.20 to 1 and a capacity from #80 to ⅜". The unit's ball bearing precision delivers highly accurate work, and its simple, rugged construction reduces maintenance to a minimum.

Recommended spindle speeds of 1200-3200 rpm will produce maximum drilling speeds up to 20,000 rpm.

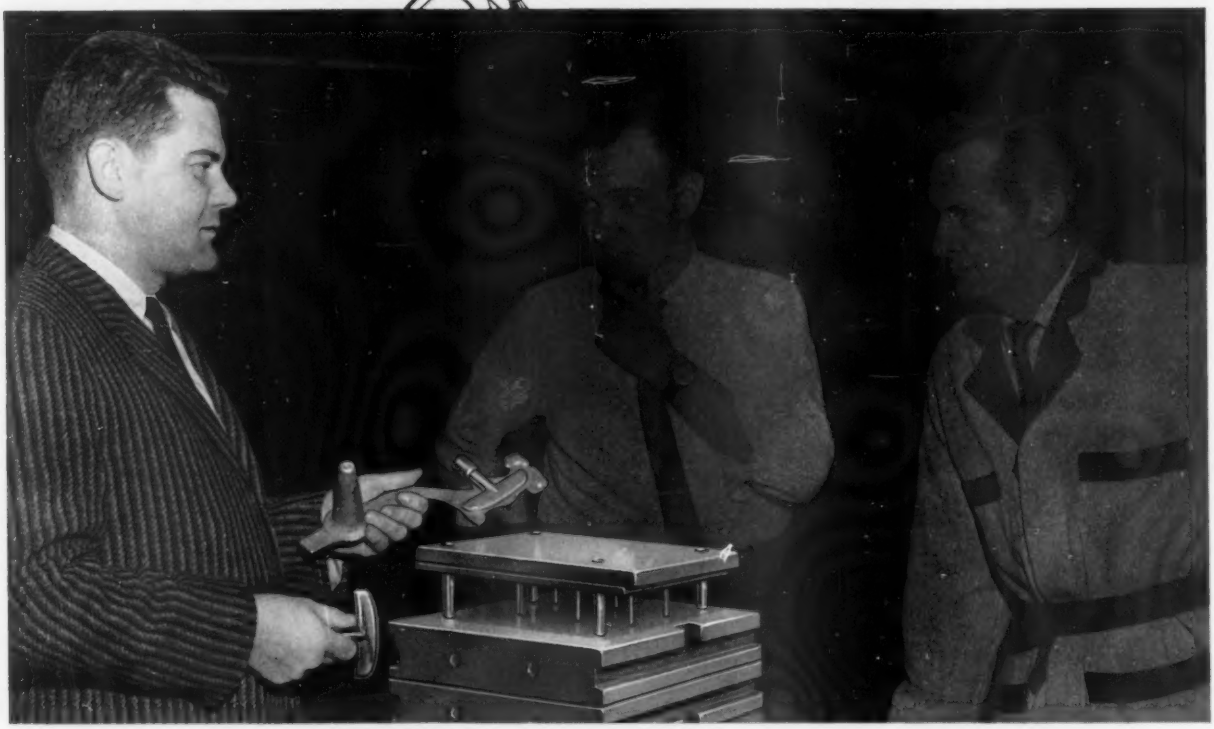
Advantages include cleaner, more accurate holes, increased drill life, less drill breakage, and greater production with fewer rejects.

Circle No. **237** on Reader Service Card

more on page 63

Why the DIE CASTER

talks D-M-E STANDARD UNIT DIES to the Die Designer and Die Maker



Changeover time goes down ...Profits on short runs go up!

Die changes on zinc or aluminum castings which normally take 3 to 5 hours are now done in minutes with D-M-E Standard Unit Dies.

D-M-E Replacement Units are fully interchangeable: Quickly and easily they're taken out and replaced in the Unit Holder . . . production is continued immediately!

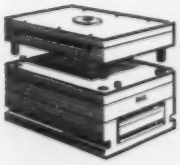
Because several jobs can run on one machine, you increase profits on short run jobs. What's more, you get the quality, the performance and the standardization of replacement parts needed for volume production work.

DIE CASTERS, DESIGNERS AND DIE MAKERS GET MORE FROM D-M-E!

• AVAILABILITY: D-M-E Replacement Units are carried in stock at your local D-M-E Branch for quick delivery. • VARIETY: D-M-E Replacement Units are available in your choice of steel and hardness. • UTILITY: D-M-E has a Standard Unit Die to fit your machine, whether you require rack and pinion or automatic "bumper-type" ejection. • FLEXIBILITY: Complete freedom on three sides of the cavity for core or cooling line placement; six leader pins and bushings for accurate alignment; "quick change" wedge clamps for positive plate positioning. • Start increasing profits on your short-run jobs with D-M-E Standard Unit Dies!

Write for your free copy of *Lower Die Cost Through Standardization.*

61-A-DC



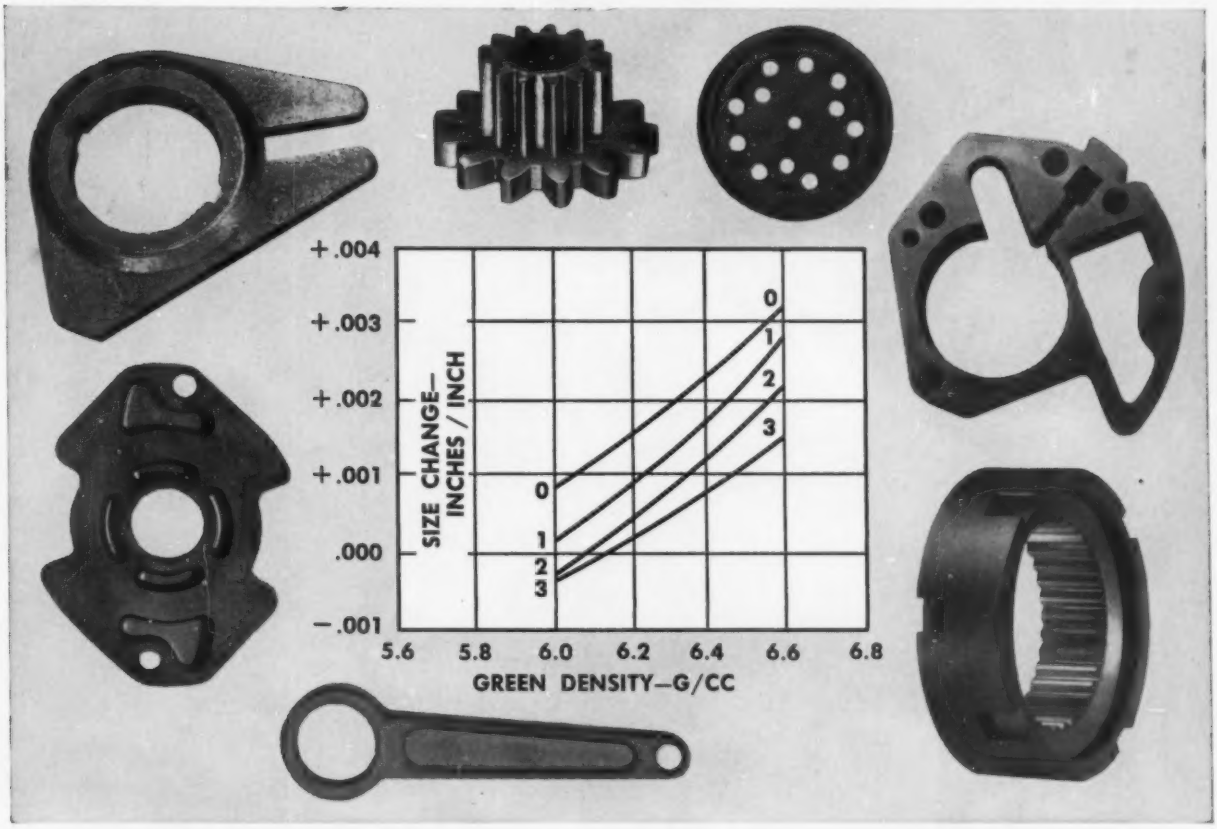
DETROIT MOLD ENGINEERING COMPANY

6686 E. McNichols Road — Detroit 12, Michigan — TWinbrook 1-1300

Chicago • Hillside, N. J. • Los Angeles • D-M-E Corp., Cleveland, Dayton
D-M-E of Canada, Inc., Toronto

Injection and Compression Mold Bases • Injection Unit Molds • Cavity Retainer Sets • Mold Plates • Ejector and Core Pins
Ejector Sleeves • Leader Pins and Bushings • Sprue Bushings • Moldmakers' Tools and Supplies

Circle No. 22 on Reader Service Card



Better dimensional control, with economy ...when you use A.W. Iron Powder

Little differences in the carbon additive to A.W. Iron Powder can make big savings in your plant.

By use of different types of carbon additives, in iron-copper-carbon mixes, a broad range of dimensional control can be achieved. This provides not only greater latitude in design specifications, but prolongs the service life of your dies. Together, these advantages result in closer tolerances for your molded parts at reduced production costs.

The curves shown above indicate the range of dimensional change obtainable with various types of carbon. *The cost of all these grades is almost identical.*

The Alan Wood 50-ton-a-day direct reduction plant, backed by years of metallurgical research, offers you the most advanced technology in Iron Powder. Make Alan Wood your Iron Powder headquarters for dependable uniformity and delivery, as well as technical advisory service.

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

FOR MORE INFORMATION

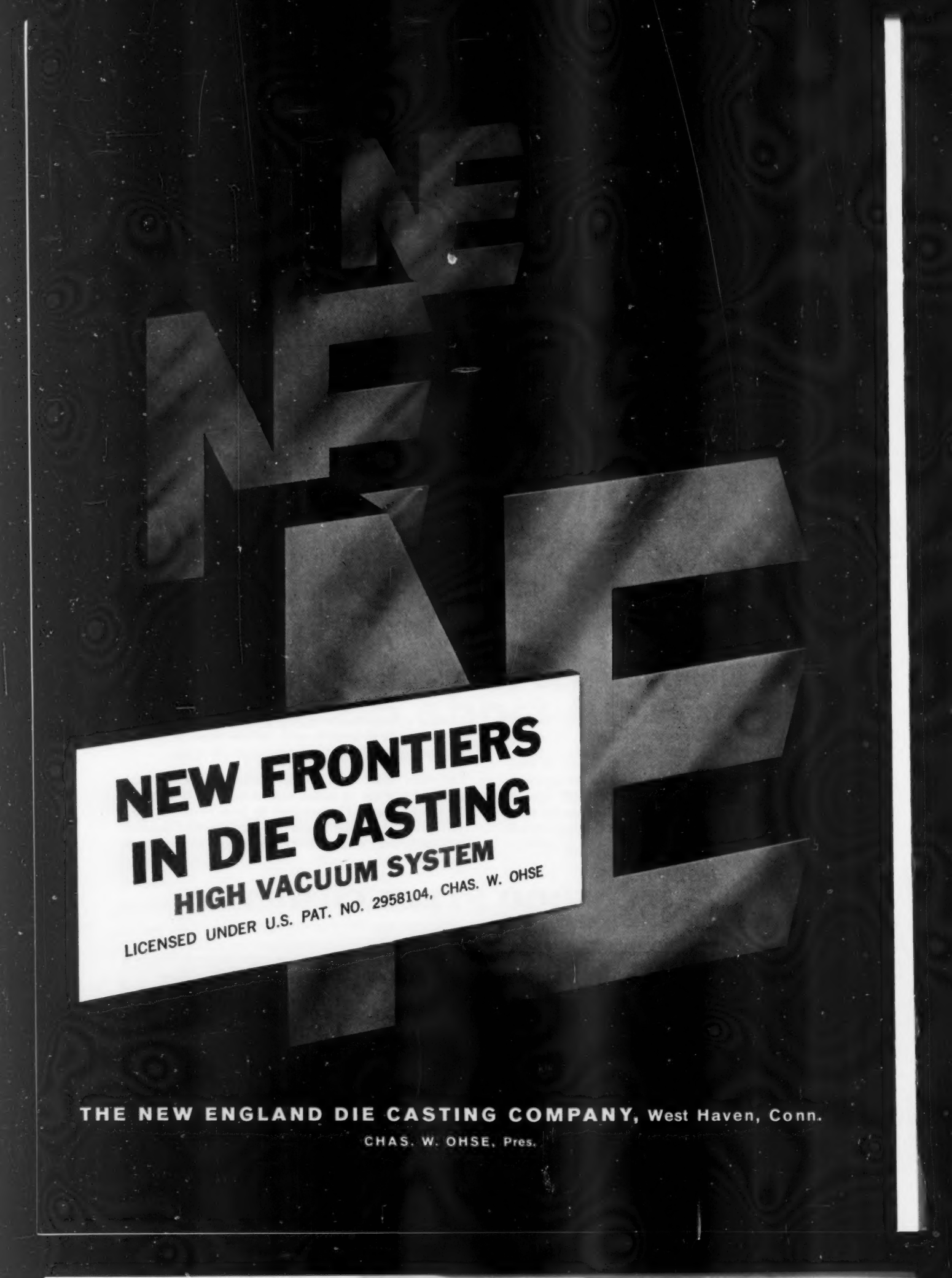
IRON POWDER DIVISION
ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send me A.W. Technical Data Bulletin #3, which gives additional details on copper-carbon additives.

NAME AND TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

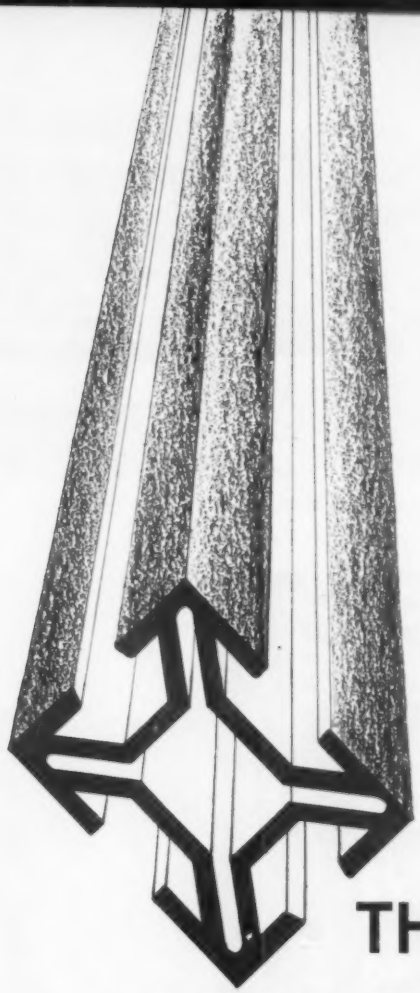
AMERICAN STEELMASTERS FOR 135 YEARS

Circle No. 3 on Reader Service Card


NEW FRONTIERS
IN DIE CASTING
HIGH VACUUM SYSTEM
LICENSED UNDER U.S. PAT. NO. 2958104, CHAS. W. OHSE
THE NEW ENGLAND DIE CASTING COMPANY, West Haven, Conn.
CHAS. W. OHSE, Pres.

Precision
Metal Molding

DECEMBER 1961



THEY'RE DESIGNING NEW PRODUCTS TO USE ALUMINUM EXTRUSIONS

DESIGNERS can create markets. Olin Aluminum believes this, and through its Market Development organization is proving it.

Rather than battle the other giants of the aluminum industry for a larger share of the same market, Olin is trying to develop new markets and customers. It does this by offering the services of its own industrial designers to help customers create new products or improve old ones.

A big factor in the success of this program is the comparative ease with which aluminum can be extruded. The variety of shapes this offers, as well as savings in fabrication and ability to take inexpensive, good-looking finishes, makes it attractive to use aluminum instead of other metals in many cases. This gives designers considerable freedom to try new approaches which combine the usually-conflicting benefits of an improved product and lower cost.

Olin's designers are not blue-sky dreamers. Nor is the Market Development organization a blue-sky group. They are not eager to develop products for the day after tomorrow; tomorrow is good enough. Nor are they interested in extracting the last ounce out of a proposed design if this means their prospective customers have to go out and buy new machinery to make it. Only occasionally, when the potential market seems large enough, do they recommend that the customer install new equipment.

New designs originate in several ways. Market Development's field men may suggest them; some originate in Olin's design group; market studies may indicate a need; or customers may ask Olin to help their own designers.

If the idea is judged sound, the field men—who are capable designers—or the Product Development Group prepare design sketches and color renderings. If the idea originates with Olin, the company then tries to search out fabricators who are likely to play an important part in the particular market. The designs are then tailored to the individual company's production facilities and marketing requirements.

Where the request for the design originates with a

customer, it becomes his exclusively if he decides to produce it. In other cases, it's made available to anyone who wants to use it.

The designs on these pages are some of the results of Olin's Market Development Program. Extrusions play an important part in each design.

FLOATING MARINA

FLOATING ISLAND MARINA

Lone Star Boat Co. of Plano, Tex., wanted an artist's illustration of a marina, to be shown at the Boat Show in New York earlier this year. The marina, as Lone Star envisioned it, would be capable of being transported over the highways, which meant its width couldn't be more than 10 ft. It had to have facilities for 200 gal. of gasoline, 24 quarts of oil, 200 lb. of ice, food, soft drinks, fishing supplies, and two restrooms. It would have to be powered by outboard motors.

Olin's designers, with the help of the company's advertising agency, came up with the design shown here—a floating aluminum island. Lone Star has received numerous inquiries on the basis of this artist's illustration.

Extrusions are used for the rub rail, framing members, hull structure, and trim. The superior performance of aluminum extrusions offered an excellent opportunity for the use of anodized tubing and hollow shapes. With their smooth surface finish, they are easy to anodize; castings would have had to be ground before anodizing.

COLORFUL OFFICE PARTITIONS

Any of Time Magazine's editorial offices in the new Time & Life Building in New York can be completely rearranged in about an hour, using just a screwdriver. This flexibility is the result of an aluminum partition system developed by Olin with Designs for Business, Inc., and Detroit Partition Co.

The panels take various painted color finishes, as well as textured coverings and vinyl. Lighting fixtures, shelves, cabinets and related equipment are clipped to the vertical extrusions in the partition system. This eliminates the need for overhead fixtures that could interfere with the placement of partitions if the office area has to be rearranged.

Aluminum extrusions were the basis for the entire system, according to Olin. No other material could do the job as simply. The heart of the system is the extruded four-way universal post (illustrated on page 25).

A magazine advertisement showing the Time & Life Building installation produced more leads than any other ad Olin Aluminum has ever run.

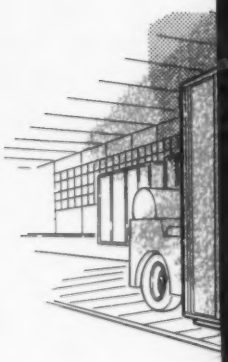
WINDOW GREENHOUSE

One of Olin's regional men developed this design for a simple, inexpensive greenhouse that can be fitted to the window of a home. Having close similarity to window construction, this design is attractive to aluminum window fabricators, and several of these, as well as a greenhouse manufacturer, are planning to build modifications of it.

Aluminum extrusions are significant for this type of application because of their light weight, strength, appearance, and flexibility of design.

Olin believes the potential market for window greenhouses is big, particularly among older people and garden hobbyists who would like to pursue their hobby during the winter.

WINDOW GREENHOUSE



CARGO CONTAINER

COLLAPSIBLE CARGO CONTAINERS

The growing trend toward containerization in the transportation and material handling fields has not caught Olin unaware. It has developed a series of designs since 1957 for pallet-sized containers. The latest is a collapsible container, to solve the problem of returning empties economically. Earlier designs had interior posts to permit the installation of a protective wood lining, and a smooth exterior; and exterior posts, with a smooth interior. All of the designs use aluminum sheet and extrusions.

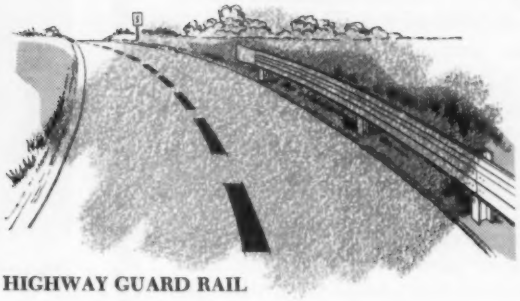
The containers weigh about 600 lb. and have a capacity of about 355 cu.ft. The light weight and high strength characteristics of aluminum extrusions spell added revenue for the user, since weight saved in the design can be transferred to allowable weight of the cargo. A similar container in wood would weigh about three times as much.

At least three manufacturers are seriously considering making at least one of Olin's designs.

OUTDOOR PATIO CHAIR

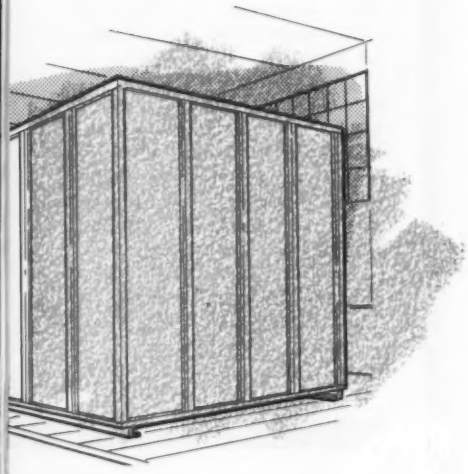
One of Olin's customers asked for the company's help in designing a patio chair for the 1962 line, combining the best features of extruded aluminum and redwood. Since cost competition in outdoor furniture is a major concern, and the current popularity of redwood has increased its price, ingenuity in shaping and detail was important to keep material and fabrication costs down.

The finished design uses extruded aluminum channels—



HIGHWAY GUARD RAIL

PATIO CHAIR



OFFICE PARTITIONS

STREAMLINED MAILBOX

less expensive than the traditional hollow shapes normally used—and redwood slats. The U-shaped channels can accommodate colored vinyl cover strips.

STATION WAGON SEATS

One of Olin's regional managers foresaw a market for a folding seat that could be placed in the rear of a six-passenger station wagon as an auxiliary seat. It would be removable to provide cargo space, if wanted (see cover).

With the help of the Product Design Group, a seat was developed on the aluminum-redwood concept of the patio chair. An alternate version uses webbed plastic instead of redwood slats for the back and seat.

As in the patio chair, U-shaped aluminum extrusions are used. An adaptor hooks onto the deck of the station wagon. The seat can be removed from the wagon by loosening a wing nut on the rear leg.

HIGHWAY GUARD RAIL

Originally designed as a guard rail for the parking lot of a large Olin installation, this extruded design is being suggested for application in the highway market.

Many of today's highway guard rails are steel, although formed sheet aluminum is making some inroads. The extruded design offers the required combination of strength and modulus of elasticity needed for the application, according to Olin. It permits the use of more-complicated shapes for better appearance, is easier to erect, is light, has better corrosion resistance, and comes in longer length per section. The extrusions can be cut easily and give a sharp, precise joint.

Several state highway departments and erection companies are interested in this design.

STREAMLINED MAILBOX

Karey Products, an Olin customer, was interested in an aluminum residential mailbox that could be fabricated from extrusions. It would be a slip-fit assembly that could be sold in hardware stores and through supply outlets.

The resulting design dramatically illustrates the flexibility of extrusions. The mailbox consists of three basic extrusions which can be fastened together. A fourth extrusion is used as a bracket attached by a set screw.

The extruded aluminum gives the finished product a structural and esthetic quality that would be difficult to achieve with formed sheet. It can be anodized or given other surface treatment to enhance its appearance.

The relatively simple assembly allows for a comfortable margin between cost and sales.

PROTOTYPE TOOLING FOR POWDERED METAL PARTS

By **FRANK J. DeMAINE,**
General Products Division
International Business Machines Corp.

UNLESS SINTERED METAL is specified early in the design stages of new products, odds are slim that it will be specified for volume production. Evaluation of product reliability, performance and serviceability is, in many industries, based on formal testing of prototype models of the product. Consequently, respecifying from castings or machined parts to sintered metal after product test demands costly retesting or a calculated risk by the development engineer.

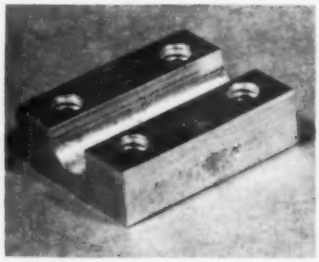
A complex machine, whether it be your automobile, or a computer system, obviously depends on the proper functioning of a great many mechanical, electrical and maybe hydraulic assemblies. And the failure of a single part in the product can generate enough suspicion about reliability to warrant a major engineering review which will probably lead to significant design changes. If failures begin to occur after shipment to a customer, the servicing and customer relations problems can be costly and damaging to the company's reputation.

It's not surprising, then, that the development engineer refrains from instituting new parts in sintered metals unless the parts have been in the product at the time of formal testing. And, for manufacturing to institute a change on a cost reduction program, retesting is going to absorb some of the anticipated savings.

Why not use sintered metal prototype parts when it appears that such parts in production would prove highly economical? A big objection is excessive cost when model parts are made on production-type tooling or even on interim tooling. Production tooling is expensive and it is likely to remain high in relation to low-volume production even with the advent of computer-to-machine tool transfer of tool design requirements.

There has been a certain amount of success in machining sintered slugs for model part purposes. But without question, such an approach to some extent invalidates product test of critical sintered parts. Mechanical and physical properties of sintered parts and machined slugs are not identical. Therefore, machine slugs do not demonstrate

continued on page 30

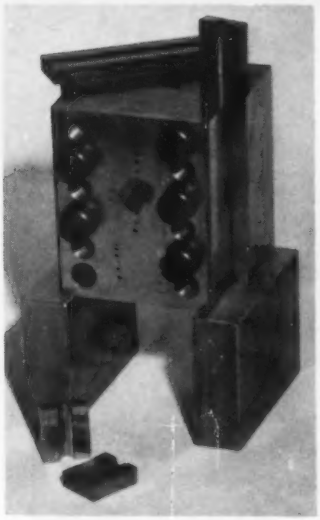


GRIPPER BLOCK

Sixty model parts were made requiring 1.48 hours per unit, including tooling time.
Tool: Briquetting die made of cold rolled carbon steel, case-hardened .030 - .040 depth, 60 - 62 Rc hardness.
Construction time for die was 24 hours.
For determining the transmittal of pressure in the die cavity, a combination of Poisson's Ratio of 0.3 for structural steel was employed, along with a modification of Lame's Formula for heavy wall thickness subjected to high internal hydrostatic pressure.*
Die was used on a brake press. Material for parts was an iron-

SLIDE WIRE CONTACT

Four hundred units were made in the following steps: briquette; sinter; repress; re-sinter; second repress; grind thickness; heat treat; tumble for grinding burrs; straighten; inspect.
Using sintered metal process and prototype tools, actual processing time was .5 hr./pc. To make the parts from sintered metal slugs required .97 hr./pc. not including slug fabrication time.
Die shown here is an unusual die developed for fabricating thin, high-density structural parts in a brake press. Die sections were fabricated from high carbon, high chrome steel using a grinding chart made on a Planetary Drafting Board and grinding the complex configuration of the die and lower punch on a visual grinder. Construction time was 62 man hours.
The flat plate which covers the die opening replaced the con-



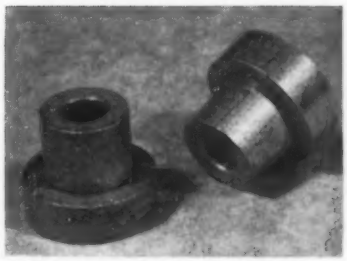
copper sinter. Drill jib was used for tapping & threading. Part started as a sintered metal spec.

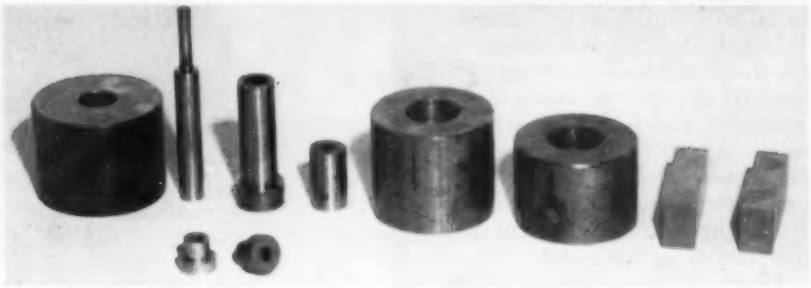
$$D = d\sqrt{\frac{S + pu}{S - pu}}$$

D = is the outer diameter of the die.
d = is the diameter or area of the compact.
S = is the maximum allowable stress of the die material.
p = is the briquetting pressure.
u = is Poisson's Ratio for steel.

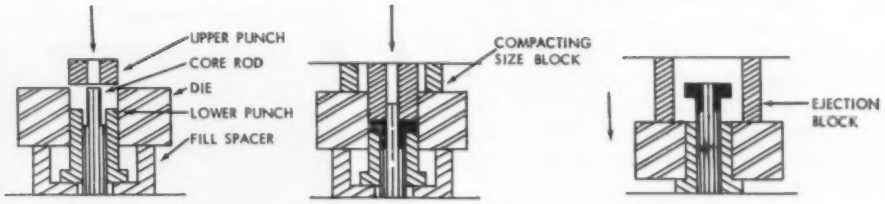
SLEEVE OF INTER-ROLL HANGER

Sixty model parts were made using sintered metal process techniques requiring 14.5 hours to build tools, briquette, sinter, repress, impregnate and inspect.





1 2 3 4 5 6 7



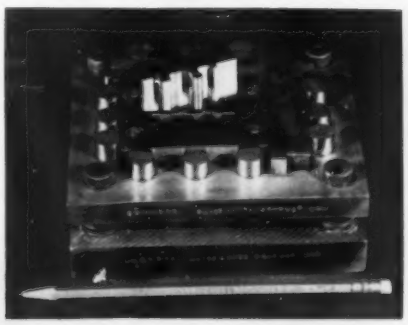
Previously, sintered metal slugs were machined to dimension. This required 20 hours for 12 pieces.
Die (bottom illustration) is composed of 7 parts. Reading from left: 1. die; 2. combination core rod and lower inner punch; 3. lower outer punch; 4. upper punch; 5. fill block; 6. size control spacer; 7. press block and ejection parallels

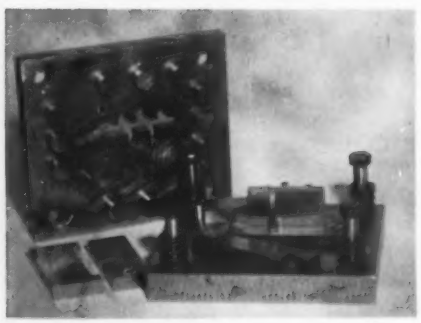
Parts 1 through 4 are case hardened, while parts 5, 6, 7 are employed soft. Construction time for the die was 10.5 hours.

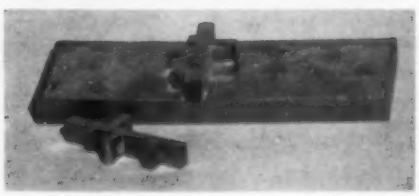
Material for the parts was sintered bronze. A KRW Hydropress was used.

ARM

ventional upper punch, and thus reduced die construction time, simplified compacting procedure and increased production rates.
It was found advantageous to reorganize the die components from briquetting die into continental die arrangement for repress operation using a punch press. Additional components needed are shown below. In compacting, flat plate was unsatisfactory, so a punch had to be used.







effectively the true property relationship of molded parts.

An example is the difference in metal density between the two approaches. A machined slug will demonstrate a much more uniform density throughout its cross section. But when a part is fully molded in its more complex configurations, the density distribution of the metal will exhibit wider variation. Unequal density distribution in the metal will have an effect upon mechanical strength, wear characteristics and heat-treating properties. Again, machined slugs do not demonstrate the same bearing properties as molded parts primarily because machining tends to close the porosity of the metal.

Aware of these complications, yet prompted by the potential of sintered techniques for fabrication of model parts, the Endicott laboratory studied sintered tooling from a practical modeling point of view. The study resulted in a threefold program for obtaining model sintered metal parts where designers had originally specified:

1. sintered metal
2. castings
3. stampings

The program accounted for the economical production of over 30 different sintered metal parts in the year following its inception. A varied number of pieces of each part were made so that in all some 5,600 pieces were produced.

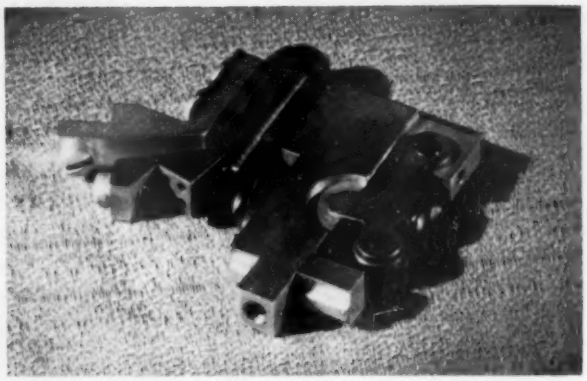
The model shop program demonstrated these advantages:

1. shorter cycle time for constructing tools and fabricating parts
2. less costly than conventional machining methods
3. valid data secured for production tooling consideration
4. test data of model parts compare favorably with production parts

In the study of prototype tooling techniques, it was apparent that the big stumbing block to economical methods is the attempt to duplicate plant production techniques. While there is value in having similar tooling so the plant can project and benefit from model shop experience, this should be done only at reasonable cost.

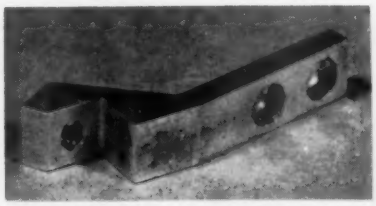
Obviously, the limited volume in a model shop can make unit costs rise exorbitantly, especially if plant production techniques are employed. Indeed, the limited volume

CONTACT BLOCK



Parts shown below all are assembled into this contact block built for use in development work.

Lower block contact terminal

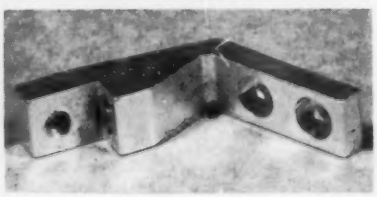


Three hundred and fifty parts were made by powdered metal process. Here's the comparison with machined aluminum castings:

	Sintered	Al Casting
Lot Size	80	60
Tooling	.842 hrs/pc.	.275
Processing	.25 hrs/pc.	1.17

Die was designed for use on a sheet metal brake press; purchased from a vendor.

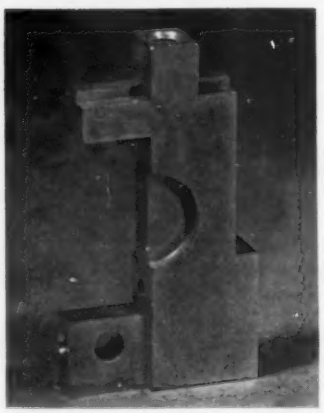
Upper block contact terminal



Three hundred and fifty parts made by powdered metal process compared with machined aluminum castings:

	Sintered	Al Casting
Lot Size	80	60
Tooling	.874 hrs/pc.	.06 hrs/pc.
Processing	.24 hrs/pc.	1.16 hrs/pc.

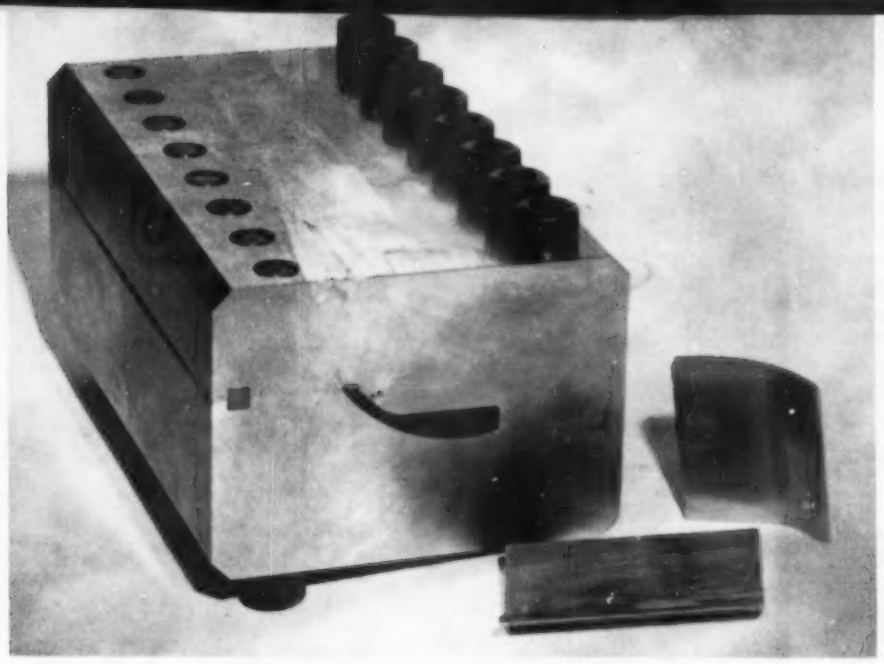
Contact mounting block



Three hundred and fifty units were made by powdered metal process. Comparison below was made with order that had been made by machining aluminum castings:

	Sintered	Al Castings
Lot Size	80	60
Tooling	.875 hrs/pc.	.275 hrs/pc
Processing	.617 hrs/pc.	2.440 hrs/pc

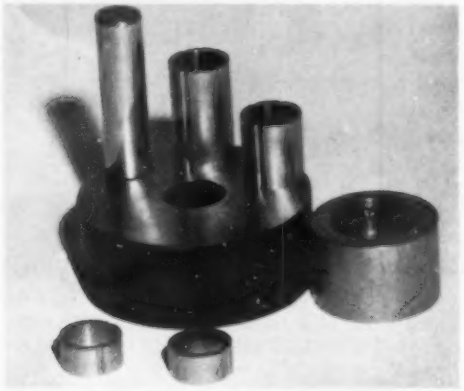
Tool construction time was 72 hours; made of high speed, heat treated steel. Half round section and lower leg were machined out after molding the part.

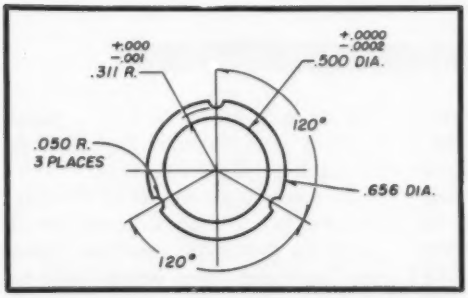


STACKER DRUM DIE

Die at left was produced for production of Insert Stacker Drum. It was designed in the model shop, but built by a tool vendor.

INSERT

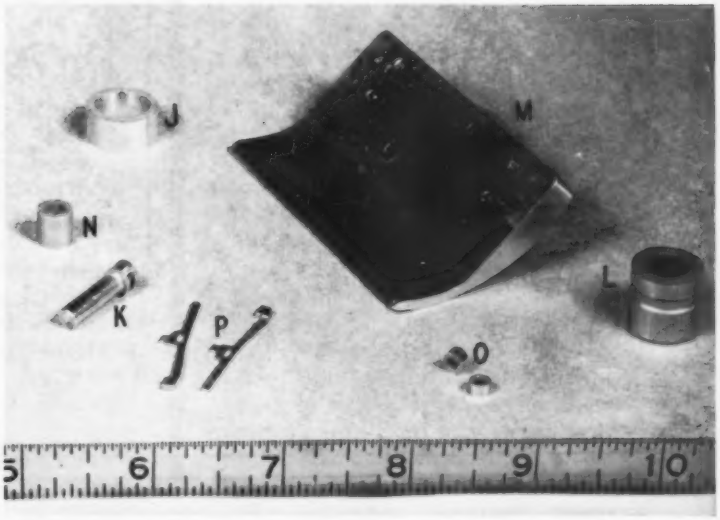




Compacting and repressing die for this part is shown in photograph; construction time for the die was 30 hours. It is made of high speed steel heat-treated to 60Rc, for use on a KRW hydropress.

Dimensions for the cross section of the part are also illustrated.

SINTERED METAL MODEL PARTS



Parts illustrated in this photograph are additional examples of various sintered metal model parts successfully produced in small lots at significant cost reductions utilizing the prototype tooling process. Parts are keyed to correspond to the following figures which illustrate tooling used to make the parts:

J Insert bushing made of iron-copper, medium density.
K Stud for brush holder lock, iron-copper, medium density
L Bushing for card guide pin, iron-copper, medium density.
M Insert Stacker drum, nickel silver, high density.
N Bearing, bail guide pivot shaft, bronze, low density.
O Bearing, hammer, armature, bronze, low density.
P Interposer, iron, high density.

encountered in the model shop suggests an immediate cost-cutting approach. While highly wear-resistant tools are a necessity in the plant, wear is not serious in the production of a relatively few model units. Thus it is possible in some cases to make prototype tools of case hardened, low carbon steels which can easily withstand the compacting of 20 or 30 parts.

Further, there is no need for a model shop with low volume requirements to arrange tooling for high production rates, as a plant would. Thus there is no point in spending money for special presses or for tools built with mechanization in mind. Hand set-up tools for individual parts, made inexpensively, should be the approach. The simplest arrangement which will provide sufficient strength to contain compressive pressures and achieve the desired form is the ideal tool. Similarly, any press capable of supporting the tools and providing the adequate compression is suitable for the task.

In sintered metal fabrication, part of the production economy comes from compacting an entire part—no matter how complex—in one operation. This can be another trap for the model shop. After all, in most instances only certain critical areas on a part will be evaluated by product test. For instance, wear and bearing surfaces as well as impact or stress locations will be under examination. Other areas need meet no high performance demand, but obviously noncritical areas can be irregular and hard to tool for. Why, then, should designers faced with a complex configuration in a noncritical area feel it necessary to mold the entire shape? Instead, the critical configuration should be compacted to print dimensions while the noncritical area is bulked out to permit convenient machining or grinding to print dimensions after repressing or heat treatment. This distinction between critical and non-critical areas on the same part can cut the tooling requirements considerably with consequent savings in tool costs and time.

An example of the kind of part on which partial machining might be considered is a contact mounting block (page 30). It is obvious from the illustration that to hold dimensions in a single molding operation would require excellent tooling and precise molds. When the part's plans were reviewed, it was decided to mold first and then cut out the half-round gap in the body and reduce the thickness of the lower leg by machining. This did not in any way interfere with proper evaluation of the part in product test, but did simplify the molding considerably. It is estimated that construction time for tooling was cut by at least a third for this part through the decision to machine these two areas.

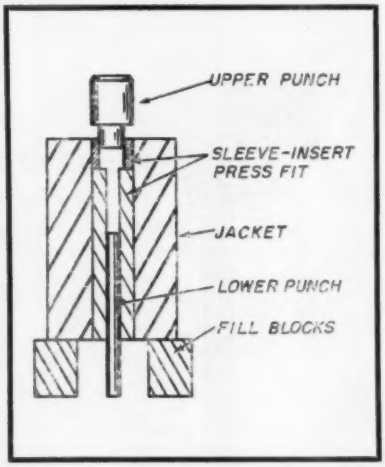
To summarize results of the laboratory in molding sintered metal parts for prototype machines, here are the three rules which help to make economical low-volume runs possible:

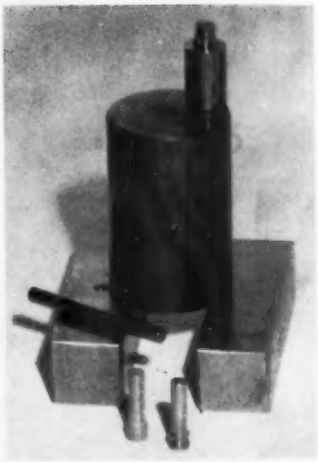
1. try to select easiest-to-work metals for tools
2. keep tools as simple as possible; use available equipment
3. don't spend extra time and money molding non-critical areas.

PIVOT SHAFT DIE

Die above was used for producing bearing and bail guide pivot shaft. It was constructed in 20 hours in the model shop.

STUD





Tool is illustrated above in both photograph and drawing. It was built in 12 hours. Materials are high speed steel, heat treated to 56 to 62 Rc with exception of fill blocks which were left soft. Tool was used on KRW hydropress.

PROTOTYPE DIE CASTINGS

A new aid to designers and product planners

By **HARRY W. BOLLMAN,**
Newton-New Haven Co.

As CUSTOM PRODUCERS of aluminum and zinc die castings for over 30 years, continual, day-to-day contact with designers and developers of new products has made us aware of a gap in the service we have been able to offer customers and prospective customers. This "gap" invariably revolved around the need of the designer for samples of a proposed die casting. Usually, these samples were needed in small quantity and for certain definite purposes:

1. To test the physical strength and characteristics of the die casting.
2. To judge the appearance of the die casting.
3. To complete assembly of the final product including the proposed die casting.

It is desirable, therefore, to provide designers the so-called sample die castings they apparently needed so badly. If part of the product planned is to be a die casting and if the designer wishes to test the function of an assembly which includes a die casting or determine the strength of a die casting as applied to his own particular needs, samples should be available without incurring the cost of permanent tooling. Quick delivery of the so-called sample die castings is also part of the package. In many cases the final assembled product had to be ready for market testing or trade shows.

In general, therefore, the overall aim was to eliminate, as far as possible, one of the most serious drawbacks in designing for die casting . . . to avoid permanent tooling to create castings which might require serious alteration after test or, in the final analysis, prove totally unsatisfactory.

An answer to this rather imposing array of problems posed by designers and product planners is Prototype Die Casting Service, or, as we call it, PDCS. The method is not new; it is a refinement and an advance in the art of plaster mold casting. The prototype castings produced by this process are much more accurate than castings which could possibly be produced by conventional plaster molding.

A study of comparative costs indicates that prototype castings produced in this way do run higher than commercial plaster molding. However, the greater degree of accuracy and their close physical resemblance to actual production die castings more than justifies the increased cost.

These castings offer tolerances that are roughly twice those for an identical condition in an identical die casting of the same alloy. Surface finish is not equal to production die castings but does come remarkably close. Finishes obtainable on these die castings are better than run-of-the-mill plaster castings and are infinitely better than the surface that can be expected from a sand cast part. In strength and physicals, they appear to approximate 80% of the same strength and physicals which would appear in a standard production die casting of the same part.

A word of caution might well be injected here for a thorough understanding of what PDCS is not. Under no circumstances do we regard this as a substitute for production die casting or any other method of mass production. It is not an end in itself. Instead, it is a low cost method of producing castings in small quantities.

One of the most important features of the process is that all these castings, and the designing which leads up to the castings, are handled with the probability in mind that the part will eventually be a die casting on a production basis. This type of approach not only results in a better production die casting but also effects many economies which could not be realized in any other way.

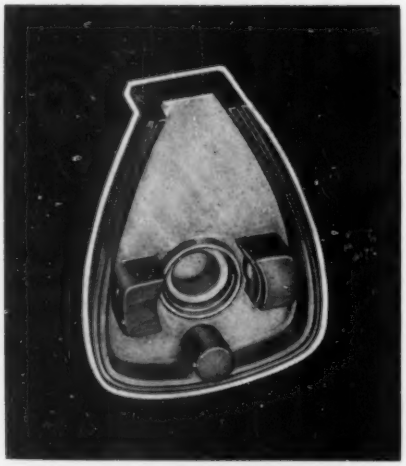
No such service could possibly be considered effective and truly complete without consideration of the time element—the period between the conception of a new product and its final testing. Anyone who has been involved in the development of a new product at the design or purchasing level is well aware of the fact that when that new product incorporates a die casting and samples are needed, those samples are usually needed in a hurry. The process meets this need adequately. In many cases a small quantity of the castings are available for assembly or test purposes in a few weeks' time as compared, in many cases, to a wait of several months for production cast-

ings. As a rule of thumb, production of prototype castings requires from 1/4 to 1/3 the time that would be necessary to produce a set of production tools.

We have made every attempt to make this a simple process with which to work. All that is required for cost estimating purposes are prints, a model or even sketches. When none of these are available, consultation with the die casting producer will develop drawings for cost estimating purposes.

The following examples clearly show the advantages of prototypes.

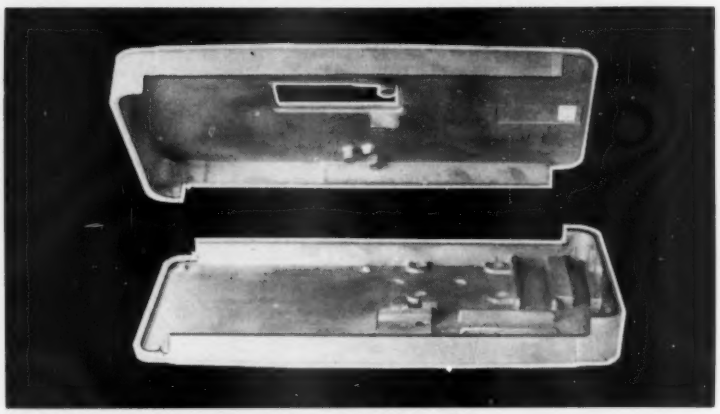
CASE BOTTOM FOR PORTABLE MIXER



Number of prototypes needed: 12
Total Cost: $300 **Delivery Time:** 3 weeks

These castings were needed for the final assembly of sample mixers to be introduced at a trade show. It is interesting to note that assembly experience with the prototype castings indicated a design change which was incorporated in the production casting with a significant cost saving. Production tooling costs eight times as much as prototype tools, but took three times as long to build. Prototype castings cost over 20 times the eventual die cast parts cost in large quantity production. *The Iona Manufacturing Co., Inc.*

COVER AND BASE FOR PORTABLE DICTATING MACHINE

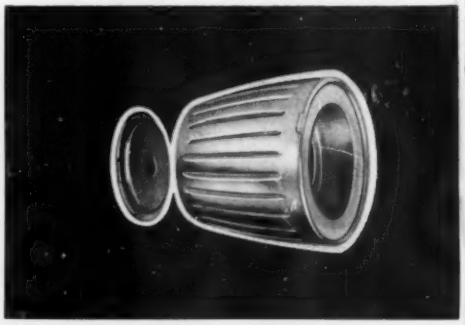


Number of prototypes needed: 30 (15 each)
Total Cost: $820 **Delivery Time:** 2½ weeks

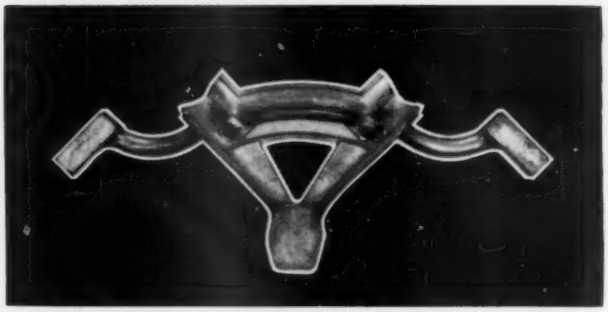
These castings were required for market test purposes. After the delivery of the original lot of 30 castings a requirement for a second lot developed. These were produced at a cost of $400. This job died in the design stage so was never figured. An educated guess is that some $7000 was saved by trying prototypes instead of building production tools and then have the job fold up. *The Soundscriber Corporation*

FRAME COVER KNOB

Number of prototypes needed: 1 each **Total Cost:** $150 **Delivery Time:** 3 weeks.
From models furnished by the customers prototype castings were produced in short order, and a deadline for a trade show was met. The production die had a quoted delivery time of 13 weeks. Production tooling required 12 weeks to complete (one week earlier than promised) and cost 50 times as much. *General Hardware Corporation*



LINE CORNER FOR HOT TRAY



Number of prototypes needed: 24
Total Cost: $600 **Delivery Time:** 2½ weeks

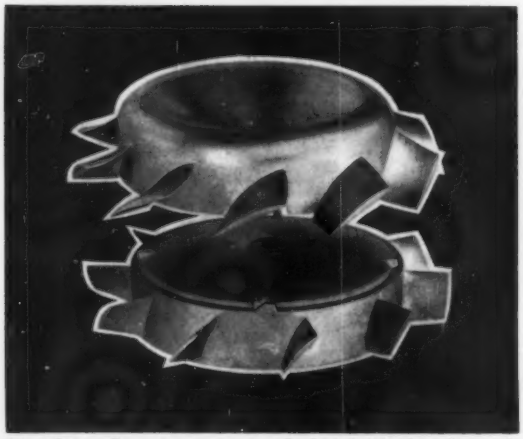
These prototype castings were required to prove acceptability of design and also provide trade show models. Production die delivery time of 12 to 14 weeks was necessary. Again—time was the factor. Production tools cost more than 10 times the cost of prototypes and tools. Production die castings in large quantities now cost about 2% of the prototype castings cost. *Salton Manufacturing Company*

RIFLE RECEIVERS

Number of prototypes needed: 4
Total Cost: $610 **Delivery Time:** 4 weeks

Prototype castings were required to test potential die cast application on parts which were originally designed as forgings. *Colt Patent Fire Arms Manufacturing Company, Inc.*

IMPELLERS



Number of prototypes needed: 12 (6 of each part)
Total Cost: $2630 **Delivery Time:** 4½ weeks

These extremely critical parts were needed for functional tests. Job still has to be proved out before production tooling will be started. Such tooling will cost at least eight times cost of complete prototype lot. But will produce castings at approximately $1. *General Dynamics Corporation, Electric Boat Div.*

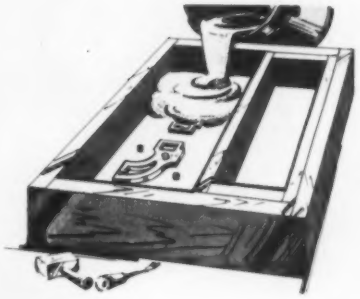
How Prototype Castings Are Made

STEP 1

The first step is to make the pattern. An exact model of the part to be cast is made of wood or metal or sometimes a combination of both. This is a precise replica of the part to exacting tolerances with provisions for shrinkage and other steps in the process which might affect size.

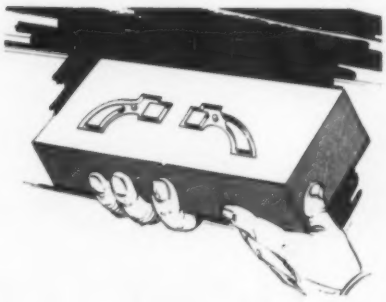
STEP 2

Step two is to make the mold. The completed pattern is placed in a container and a specially prepared investment material poured over it, under vibration, to insure compact and complete filling for uniform density. In some casts, a mold is made in sections depending on the shape of the pattern.



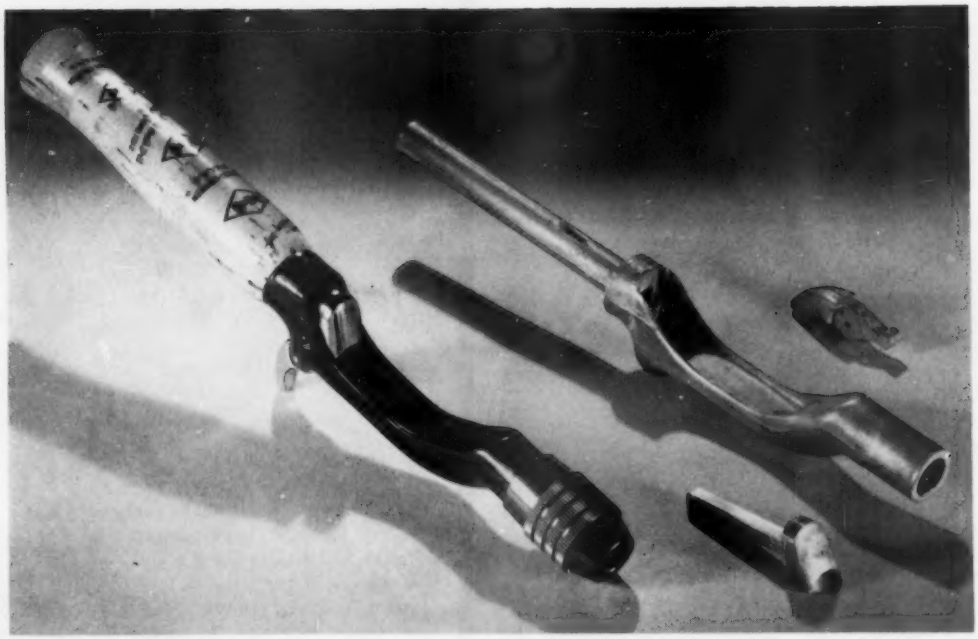
STEP 3

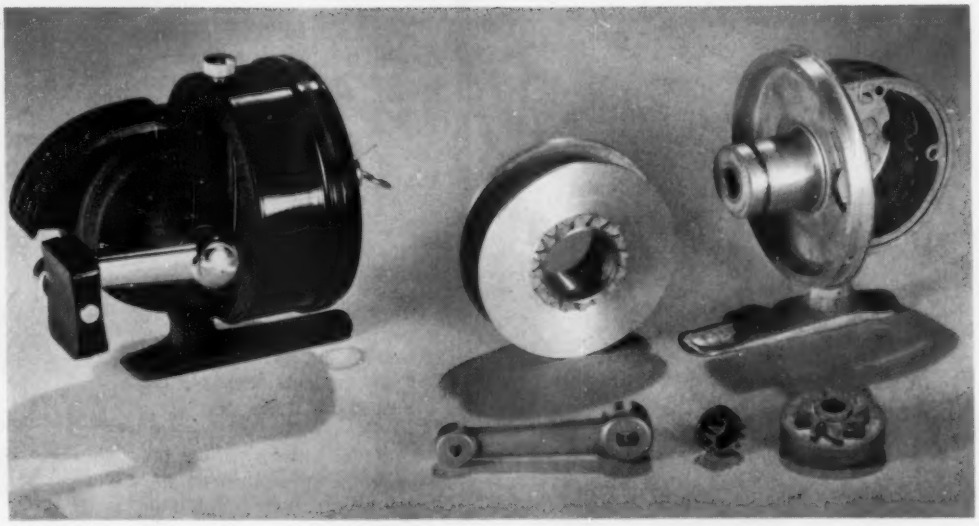
Step three is to pour the metal. After the hardened investment mold is removed from the container and pattern the critical step of injecting metal under pressure follows. This is a specially developed procedure employing either zinc or aluminum. It approaches, with a high degree of accuracy, the actual flow of metal in a production die casting machine.



STEP 4

Step four results in a prototype die casting. The investment mold is destroyed in ejecting the prototype die casting which necessitates a repeat of steps two and three for each casting needed. In every instance, however, the result is a simulated die casting with the closely approximated appearance and strength of a production die casting, without the cost of permanent tooling.





DIE CAST parts for fishing tackle are plunger, rod handle grip, and trigger (top photo), and crank, spool, gear and pinion, and reel frame (bottom photo).

LIGHT, STRONG FISHING TACKLE

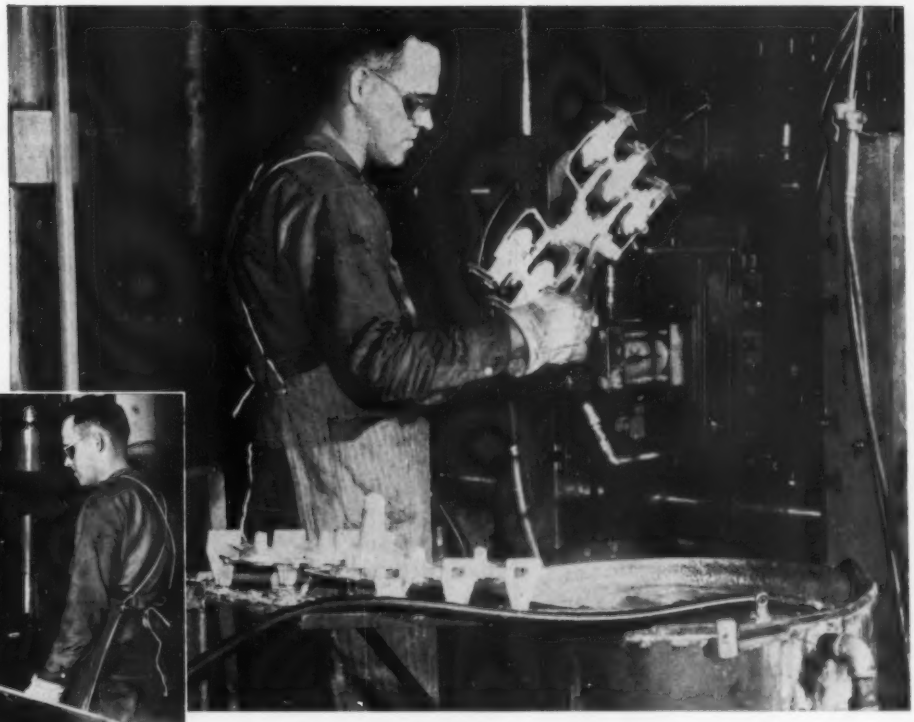
A FISHERMAN holds eight die castings in one hand when he casts with this rod handle and reel made by the Horrocks-Ibbotson Company. The components for this equipment must be strong, rigid, and light weight. Exposed surfaces must be smooth. Die cast parts meet these requirements and keep the cost low.

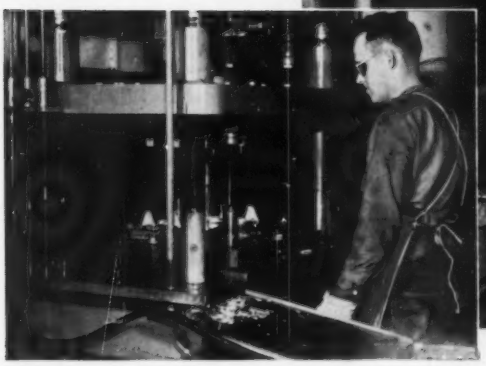
The reel frame, spool, and rod handle grip are aluminum. The crank, gear and pinion, plunger, and trigger are zinc.

All the zinc parts are chromium plated except for the gear and pinion, which has a Cronak finish. The Cronak process minimizes the formation of heavy corrosion product films on zinc under adverse exposure conditions. It consists of a simple dip in a solution containing hexavalent chromium ions and produces a protective, golden brown film.

The grip is alodized and finished with baked enamel. The reel frame and spool receive a chromate conversion coating for improved corrosion resistance and a better base for paint. The frame is enameled.

The reel frame and spool use brass bushings for bearing surfaces.



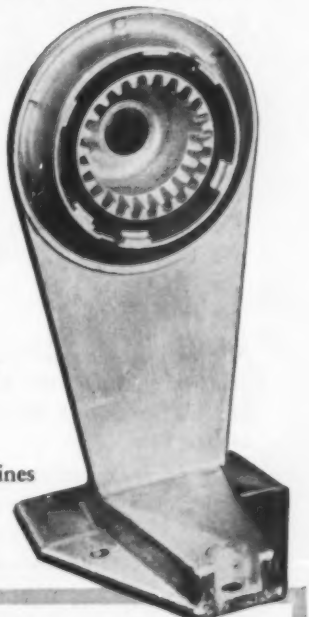


6500 DIE CASTINGS A DAY!

Greenlee-B&T "Production Teammates" combine quality with quantity for Apsco Products, Inc.

"Ace" Fisher, of Apsco's Die Casting Department says: "These Greenlee - B & T machines are the best we have had in the plant."

Greenlee - B & T "Production Teammates" — a 300 ton hot chamber die casting machine and a 28 ton trim press have solved the problems of quality castings in volume quantities for Apsco Products, Inc., Rockford, Illinois. "Hardware" finish, high density die castings, such as the intricate pencil sharpener base shown at right, are produced at a rate of 6500 pieces a day. World leader in the manufacture of pencil sharpening equipment, Apsco maintains high standards in producing sharpeners of rugged construction and functional design. Get acquainted with Greenlee - B & T's "Production Teammates." Write for complete information.



You get so much more from Greenlee - B & T

- Improved Hydraulic System • Automatic Machines
- Two Stage Variable-Speed Shot Control
- Motorized Die Height Adjustment
- Four-Corner Link Lock-Up

PRODUCTION MACHINERY
GREENLEE
B&T

B&T MACHINERY COMPANY

A DIVISION OF GREENLEE BROS. & CO.

217 W. EIGHTH ST.
HOLLAND, MICHIGAN
phone EXport 2-2341

TRANSFER MACHINES • SPECIAL MACHINES • AUTOMATIC BAR MACHINES • WOODWORKING MACHINES AND TOOLS • DIE CASTING MACHINES • TRIM PRESSES • HYDRAULIC AND HAND TOOLS

Circle No. 14 on Reader Service Card

"TIFFIN POTS LAST LONGER"

This is a report that we continue to receive from our customers.

Standard melting kettles and machine pots direct from stock are available for all non-ferrous metals.

Special pots are made to your specifications.

We also furnish the following parts in Tiffin alloyd iron or alloyd steel:

- PLUNGERS
- NOZZLES
- GOOSENECK NOSES
- THERMO COUPLES
- INGOT MOLDS
- BAR STOCK

All parts are especially engineered to give the best possible service in the die casting field.

OVER 50 YEARS EXPERIENCE in the manufacture of quality pots and die equipment.

FREE BROCHURE lists stock pots.

Be Thrifty — Be Wise
Use The Best . . .

THE TIFFIN FOUNDRY, INC.
Phone: Gibson 7-3991
TIFFIN, OHIO
Circle No. 53 on Reader Service Card

PERMANENT MOLD EXCEEDS STRENGTH

By **HENRY LEFER**, *Eastern Editor*

AIR-DEFENSE MISSILES, like Douglas Aircraft Co.'s Nike Hercules, are one-shot weapons. Nevertheless, after they've been emplaced, they are cycled many hundreds of times on a periodic basis to test their constant readiness. So, structural parts must combine high strength with the expected requirement of lightness.

A part which exemplifies this strength-weight combination is the elevon hinge on the Nike Hercules. It connects the elevon—the missile's flight control surface—with the main fin. It is about 24 in. long and weighs about 4 lb.

Made as a high-purity permanent mold casting of A 356 aluminum and heat-treated to the T6 condition, it exceeds Douglas's blueprint strength requirements.

A 356 was chosen because it was the highest-strength aluminum alloy covered by a MIL specification. But its standard mechanical properties fall short of those required. Douglas wanted 44,000 psi tensile strength (vs. 38,000 psi standard), 38,000 psi yield (vs. 28,000 psi standard) and 5% elongation (same as standard).

Hampden Brass & Aluminum Co., which makes the part, was able to not only meet, but exceed Douglas's requirements. The secret, according to Hampden's Pat DeLiso, lay in careful attention to the purity of the metal and close control of pouring and cooling.

Hampden had been making the hinge as a sand casting. It's a tricky part, with as many as five different planes on a face. The angles and dimensions of all the planes are critical. To get the casting out of the mold, the mold had to be back-drafted, then the part had to be ground and machined to get the required draft. Ten different surfaces had to be ground.

It used to take a week just for inspection, grinding, re-inspection, re-grinding, and so on, before the part could pass final inspection. This was expensive, but still cheaper than an extrusion or forging.

Hampden's designers thought the cost of the part could be cut considerably by converting to a permanent mold casting. Douglas doubted that it could be done, and indeed, it took several months before all the problems were solved. But now, thousands of the hinges have been made as permanent mold castings, at a cost saving of 25%.

The permanent mold hinge takes only 5 hours for inspection, as the planes are cast clean and accurate, and require no grinding.

Casting technique closely controlled

The mold is a Meehanite multipiece unit, with sand-shell cores. Fresh metal is used for every heat, and the bottom quarter of the melt is discarded. The mold is prepared with a special wash developed by Hampden to control the insulation and make sure the casting solidifies at the proper rate.

Also critical are the maximum melting temperature and the holding furnace temperature; this latter must be kept within a 50°F range. Turbulence must be avoided in transferrng the molten alloy from the breakdown furnace to the holding furnace.

After solidification of the castings, the sand cores are broken out

CASTING REQUIREMENTS

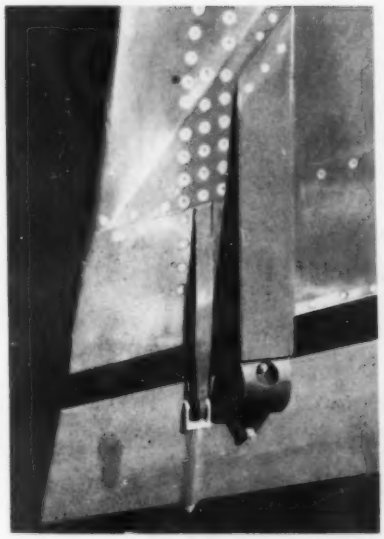
with hand tools, then shaken out on a vibrator.

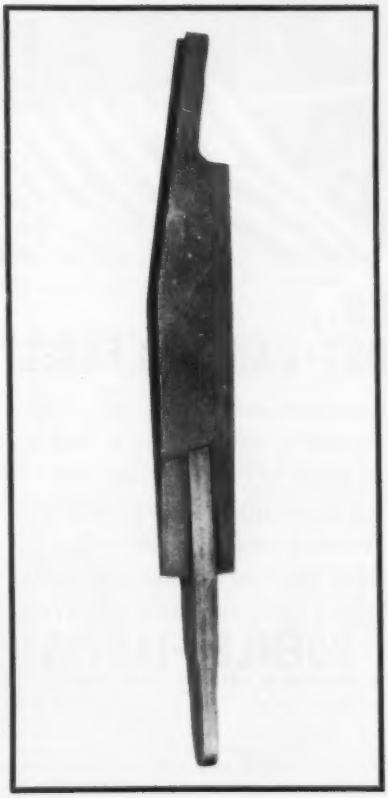
After air-cooling to room temperature, the castings are cleaned, heat-treated to the T6 condition, then straightened on a fixture to within thousands of an inch on the longitudinal axis. The castings are then air-aged.

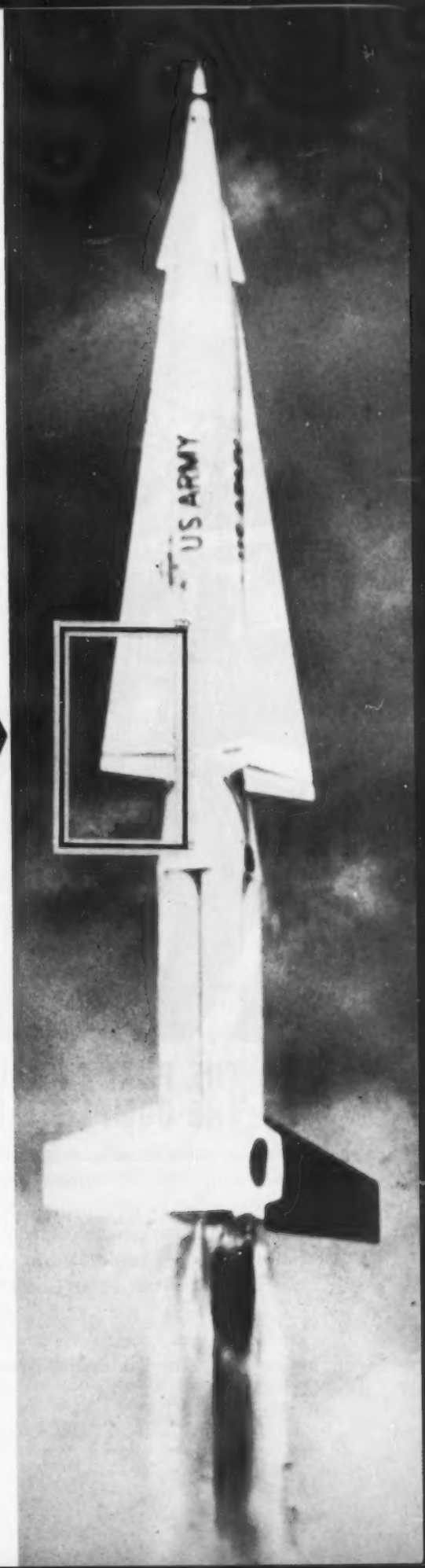
Hinge surpasses requirements

A sample from each heat is analyzed by the lab to make sure it meets Douglas's specifications. Because of the critical nature of the part, both Douglas and Hampden test one hinge from each heat to destruction. Of the thousands that have been made as permanent mold castings, none has been rejected for breakage or inferior quality.

In a static bending test developed by Douglas Aircraft's Charlotte division, the average fracture loading of 84 hinges tested was about 15% above the test requirement. The weakest hinge was about 8% stronger than required and the strongest exceeded the requirement by more than 40%. Permanent set under static loading was also far below the allowable.







ELEVON HINGE CASTING (bottom left) is two feet long, but has only a ten-inch shank visible in the final assemble (upper left). Box in photo on the right shows the hinge's location on Douglas Aircraft's Nike Hercules ground-to-air missile.

THE PLANT IS OURS... THE COMPLETE POST-CASTING FACILITIES ARE YOURS

We're die casters, of course. Biggest, best-equipped, most service-minded in the business. More facilities, more highly experienced personnel, the widest range of die-castable alloys, our own fleet of trucks to give overnight rush service when needed. When you want a part die cast, you can't do better than Doehler-Jarvis. *But that's not all!* If you're a cost-conscious purchasing agent or production man, consider the other advantages of using Doehler-Jarvis. We'll not only die cast the part you want, but drill it, tap it, ream it, buff it, degrease it, finish it (plate it, paint it, anodize it, or whatever), sub-assemble it, inspect it, package it and ship it. To you or direct to your distributors. The plant is ours, but the production line—from blueprint to final packaging—is yours. Chances are we can save you money every step of the way. Ask Doehler-Jarvis to quote on your very next job. Call or write the Doehler-Jarvis office or plant nearest you.

DOEHLER-JARVIS
DIVISION OF NATIONAL LEAD COMPANY

GENERAL OFFICES: TOLEDO 1, OHIO. PLANTS AND SALES OFFICES: TOLEDO, OHIO; GRAND RAPIDS, MICHIGAN; POTTSTOWN, PENNSYLVANIA; BATAVIA, NEW YORK. IN CANADA: BARBER DIE CASTING CO., LTD., HAMILTON, ONTARIO. IN BRAZIL: INDUSTRIAS DOEHLER DO BRASIL, S. A., SAO BERNARDO DO CAMPO, SAO PAULO. IN ARGENTINA: DOEHLER ARGENTINA, S. A., BUENOS AIRES. IN GREAT BRITAIN: METAL CASTINGS-DOEHLER, LTD., WORCESTER, ENGLAND.

Circle No. 59 on Reader Service Card

Above: Charles Lake, right, founder-president of WOSCO holds original sand casting. Jerry Lake, his son, holds same part re-designed for permanent mold casting.

Left: WOSCO installed one of first shell molding machines to be seen in a western foundry.

Below: Container on top of permanent mold preheats bushing inserts. Integral casting with inserts lowered costs.

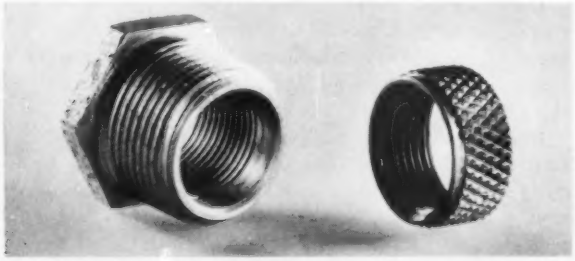
RAIN FOR RENT

By **SCHOLER BANGS,** *Western Editor*

"OVER 90 percent by dollar volume of everything we make is produced by permanent mold casting."

It was Charles Lake speaking. He is founder and president of Western Oilfields Supply Company in Bakersfield, California.

WOSCO no longer fabricates and distributes oil well piping. Only the company name is left to suggest its original business. Today the Bakersfield firm produces farm sprinkler systems which it leases and sells for overhead irrigation. Highways are dotted with its billboards advertising "RAIN FOR RENT". It is big business, and it consumes vast quantities of aluminum valves and couplings. Precision casting helped it get where it is today, and Jerry Lake, son and associate of WOSCO's founder, said, "We would like to see all of our fittings produced by permanent mold."



Old, costly bushing on the left had to be installed after part had been cast. Redesigned insert on the right is cast-in.

In 1949 we manufactured only one fitting, and it was sand cast. Today two 500 lb. furnaces are kept busy casting 84 permanent mold fittings. An additional 40 fittings, produced in quantities too small to justify permanent mold tooling, are sand cast. Of the latter, five probably will be converted to permanent mold this year.

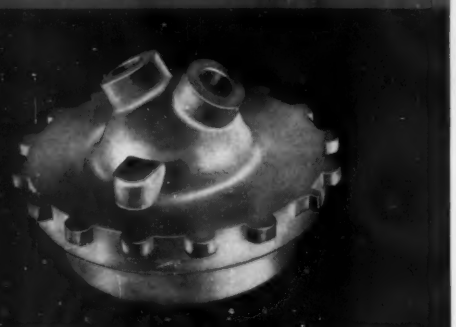
The first foundry was started as a separate corporation six years ago and quickly began conversion of high production parts, originally sand cast, to permanent mold.

They are permanent mold enthusiasts because the process gives quality and strength that attracts new customers and then makes them repeaters. Also, it cuts production costs fantastically.

continued on next page

STRONG-TOUGH

...To Withstand Extreme Stress And High Temperature



CASTING ENGINEERS INVESTMENT CASTING For Rocket Igniters

■ This large, high-strength structural steel casting, produced for Thiokol Chemical Corp., Redstone Division, is an adapter for igniters used in solid propellant rocket motors.

The component exceeded rigid specifications—**no defects were permitted** and proved 100% reliable under the extreme pressures and temperatures that were encountered in flight.

The remarkable MONOCAST ceramic shell technique, exclusive with Casting Engineers, reduces or eliminates machining and secondary operations, minimizes rejects, and provides new design freedom for complex configuration. MONOCAST units are precision, high-density castings produced with repetitive precision in volume quantities. Casting Engineers has the ability and facilities to provide you with precision investment castings to meet the toughest requirements of space vehicles or down-to-earth industrial applications.

Whether your application requires the new MONOCAST ceramic shell technique for relatively large parts, or our high-volume MINICAST process for small components, Casting Engineers guarantees maximum production efficiency at lowest cost.

A competent staff of design, mechanical and metallurgical specialists makes Casting Engineers your best single supply source for castings for any application.

SPECIFICATIONS

Material
4340 high-strength structural steel

Minimum Requirements:
Yield Strength
160-180,000 psi
Elongation
7%

Typical Results:
Tensile Strength
195,000 psi
Yield Strength
180,000 psi
Elongation
9-10%

Overall Diameter
5½"
Weight
4½ lbs.
Inspection
100% X-Ray, Class 1A, no defects allowed

Free brochure tells how to cut costs by specifying investment castings. Write for your copy now.

MINICAST MONOCAST

Casting Engineers

PLANTS IN CHICAGO AND NEW YORK CITY

Address Inquiries to:

2329 N. BOSWORTH AVE. • CHICAGO 14, ILL.

BUckingham 1-5940

Circle No. 60 on Reader Service Card

For example, in a photo on page 41 you see Charles Lake holding a six inch valve housing originally produced as a sand casting. His son, Jerry, holds a counterpart housing re-designed for permanent mold.

Because the permanent mold casting offered greater strength it could be designed for reduced wall thickness in several areas. The sand casting weighs eight pounds six ounces. The permanent mold casting weighs five pounds three ounces.

By switching to permanent mold WOSCO shows a cost saving of $1848 per year for just this one casting. This valve housing is produced at a rate of 2000 units per year. The heavier sand casting would have consumed 17,000 lbs. of 28¢/lb. aluminum during a year. The permanent mold casting uses only 10,400 lbs. per yr.

Production rate of the one item gives a clue to why the company decided to switch to permanent molding. But there were other reasons as well.

The foundry saves middleman and transportation costs, and can hold mold costs to not more than six cents per casting.

Also, having its foundry on the premises enables the installation of rigid quality control from start to finish. Mold performance can be studied on the scene. This has enabled the company to design parts requiring a minimum of gating and risers, and develop molds that will have long life. WOSCO expects a permanent mold to deliver at least 55,000 good castings. Their first permanent mold, eight years old, still is usable.

In addition to its two furnaces, which serve four permanent mold pouring locations, the WOSCO foundry produces its own sand cores and shells. Their shell molding machine in the photo was installed seven years ago and was among the first of such machines to appear in western foundries.

Cast-in insert lowers costs

Having the foundry immediately available has made possible a number of product innovations which simplify "Rain For Rent" parts and lower production costs. One example is a four inch pipe coupling.

As originally designed, the coupling was cast with a simple hole to receive a hexagonal head threaded insert for attachment of a one inch water pipe. The bushing and labor cost of installation totaled 19 cents per hole.

Design engineers conceived the idea of cast-in threading of the hole. They designed a simple steel insert (see photo) which could be slipped over a locator pin in the mold and made an integral part of the casting as it was poured.

In contrast to the separately installed hexagonal bushing, which cost 19¢ installed, the cast-in insert costs only 11¢, and yields a finished hole cost reduction of 42 percent.

The only foundry process not undertaken by WOSCO is mold making. Meehanite molds are produced by a Los Angeles diemaking firm.

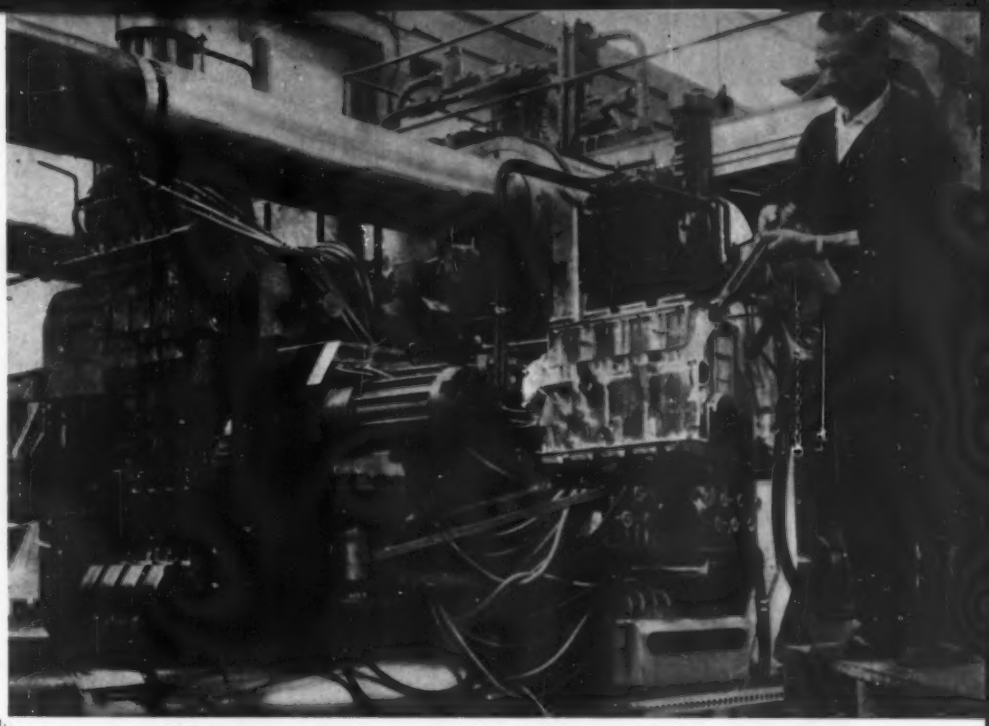
Circle No. 54

All Die Casting Machines are normally fitted with:

- VICKERS hydraulics
- SIEMENS electrics
- Automatic cycle equipment with program preselecting panel

and can also be equipped with:

- DOSOMATIC: automatic dosing-filling furnace for cold chamber machines
- Vacuum die casting device
- Automatic forced lubrication of all mechanical parts
- Oversize water hydraulic plant for fast cycling
- Device for the automatic control of the oil temperature
- Trim press, oil operated, fast cycling — for trimming burrs and sprues



Our Standard Production:

- Deep-drawing presses
- Arbor presses — Extruding presses
- Coining, gauging, hobbing presses
- High pressure hydraulic pumps
- Injection moulding machines for plastics
  Models with preplasticizer: from 3 to 705 oz. Without preplasticizer: from ¾ to 28 oz.
- Vertical presses for thermosetting materials
- Thermoforming machines for thermoplastic laminates
- Blow moulding machines for plastic hollow items
- Screws and complete extruding plants
  for making films, rigid and flexible profiles, hollow coatings, plastics coloring and granulation
- Presses for polyesters and for plastic laminates
- Record moulding presses
- Special plants for processing plastics

2500 U.S. TONS

LOCKING FORCE

Weight of the casting (Al. base) up to 130 lbs.

COLD CHAMBER DIE CASTING MACHINE
POSITIVE CLAMPING SYSTEM BY BLOCKED PISTON

DIE CASTING MACHINES

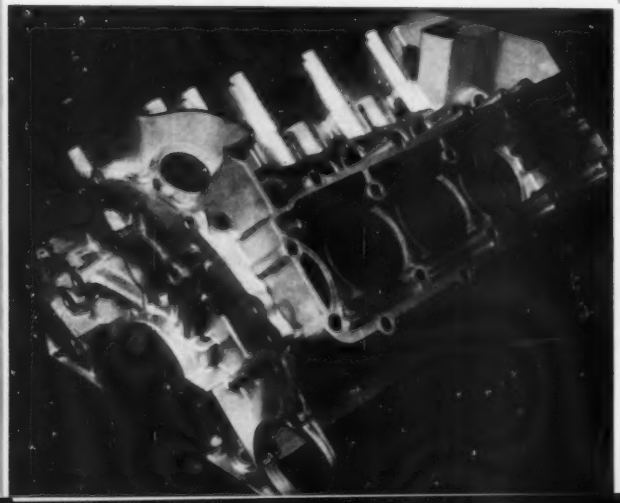
Oil operated—automatic—fast cycling

COLD CHAMBER

Vertical and horizontal oil injection

and HOT CHAMBER

From 35 to 2500 U.S. Tons



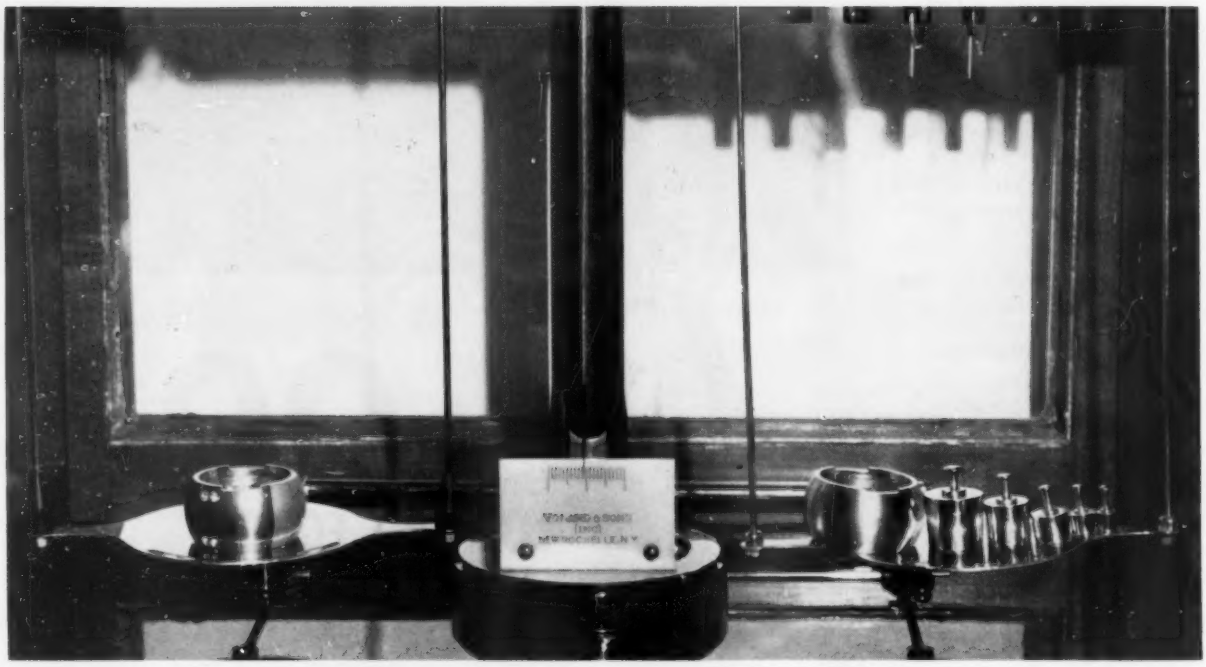
TRIULZI

NOVATE (MILANO)
TEL. 3.491.661/2/3/4
3.491.785/6/7/8

VIA VIALBA, 56
TELEGRAPH: TRIULZIPRES
NOVATE MILANESE

FOR DIE CASTING BLOCKS-4-6-8 CYLINDER BLOCKS

SINTERED TUNGSTEN ALLOY FOR HIGH DENSITY APPLICATION



BALANCE DEMONSTRATION shows the superiority of tungsten over steel when used in gyro motor rims. Notice the balance scale weights necessary to bring the steel rim, in right pan, in balance with tungsten rim in pan at left. Tungsten has a density more than twice that of steel. That characteristic, combined with its strength, makes it an ideal material for gyro motor rims. In one case the angular momentum with a tungsten rim is 76% greater than with a steel rim.

THE STABILITY of a gyroscope is directly proportional to the angular momentum of its rotating mass. That's why the Instrument Division of Lear, Inc., wanted a motor rim of the highest possible density for use in a guidance system gyroscope.

Gyroscopes are the heart of guidance and control systems for aircraft and missiles. When the gyroscope's motor rim is mounted properly and is set spinning at high speeds (in this case, 24,000 rpm), its axis remains rigid regardless of how or where the gyroscope is moved. The denser the motor rim and the faster it spins, the more rigid the axis tends to remain. It is this phenomenon that makes the gyroscope an ideal reference in flight.

However, high rotating speeds produce high centrifugal stresses, and these stresses have a tendency to distort the diameter of the rim. Any distortion of the rim's diameter changes the characteristics of the gyroscope and could affect its accuracy. The trick is to find a motor rim material with the right combination of density and strength to produce the highest possible angular momentum.

Lear has found that a sintered tungsten motor rim works best. It has a density more than twice that of steel, which was formerly used. Whereas a steel motor rim would be limited to a maximum angular momentum of 242,000 gram-cm^2/sec for a given space package, sintered tungsten's high density allows an angular momentum of 428,000 gram-cm^2/sec in the same space package. Sintered tungsten's high yield strength of 75,000 psi makes it ideal for applications requiring substantially higher angular momentum.

A vendor makes the rim from a powder which is 90% tungsten, 6% nickel and 4% copper. Lear bores the inside and grinds the outside diameters. The tungsten part costs more than the machined steel bar stock it replaced, but Lear spokesmen say the increase in system accuracy is well worth the extra cost.

Small sintered weights of the same composition are used to keep the gyroscope in balance.

Diecasting with EMB

bigger output — less cost

Compressed air at 150 lbs./sq. in. gives high speed which is controllable by a self-contained hydraulic system.

Quick acting valves pilot operated.

Controls very sensitive — hand operated for setting up, automatic for production.

Zinc furnace fired by coal gas, natural gas or oil.

Machines can be serviced by any good mechanic — no electrics are used.

Takes only 2 hours to convert from hot chamber to cold chamber.

Units completely interchangeable.

MACHINE SIZE	No. 10	No. 12A
Wt. per shot zinc base lbs	2¾	6'3"
Wt. per shot aluminum lbs	1¼	2'1"
Max. die	16" x 10"	20" x 12½"
Platen stroke	6"	8"

Larger sizes available

E. M. B. Co. Ltd.

WEST BROMWICH • ENGLAND

EMB No. 10 Automatic Diecaster for Zinc

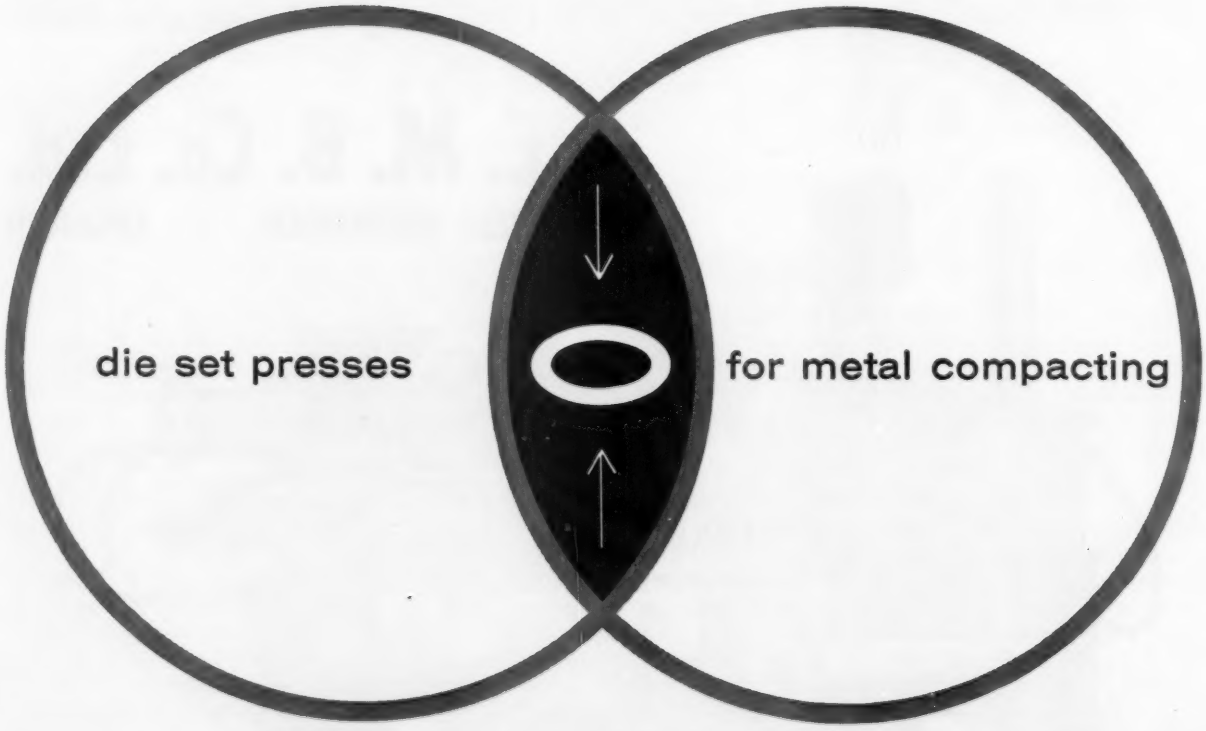
Circle No. 61 on Reader Service Card

STOKES brings the proved precision of die set construction to powder metal compacting! Specifically designed for the manufacture of products demanding extremely high dimensional precision, these die set presses provide the accuracy and guidance required to operate tooling with punch and die clearance as fine as .0001″. Die set construction makes setups and adjustments a snap. The complete die set can be removed from the press, the necessary tool changes made, and returned to the press in minutes. And for extra-long wear, all operating parts are made of hardened tool steel.

This new line of die set presses ranges from ½ ton to 100 tons. Presses include all the automatic and high-speed features . . . plus the attention to engineering details that have made Stokes presses famous throughout the world for more than 60 years.

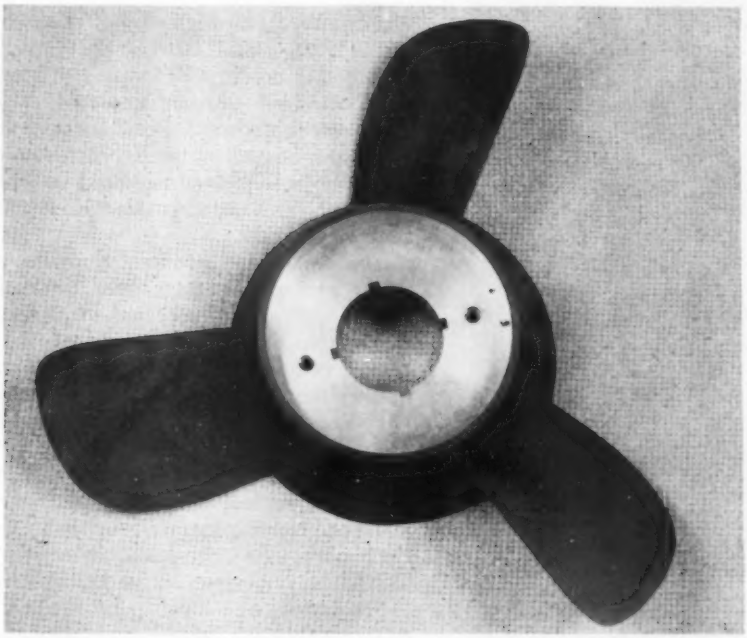
Get all the news on these and other Stokes powder metal presses by contacting your nearest Stokes representative. Powder Metal Press Division, F. J. Stokes Corporation, 5500 Tabor Road, Philadelphia 20, Pennsylvania.

PRECISION



Put STOKES 50 years of compacting experience to work for YOU!

Circle No. 50 on Reader Service Card



DARK AREA of this aluminum part has been hardcoated. Light colored area was masked to prevent formation of the coating.

HARDCOAT MAKES ALUMINUM HARD AS GLASS

By **LAWRENCE I. ASHLEY,** *Vice President, Metal Finishers, Inc.*

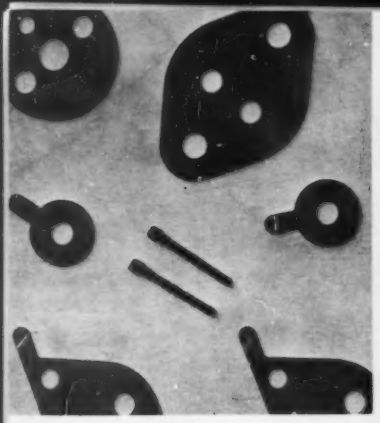
YOU CAN PUT a protective coating on aluminum and its alloys that's hard enough to scratch glass.

It resists wear and shrugs off the corrosion of salt and industrial atmospheres. It's an electrical insulator, with voltage breakdown ratings between 500 and 3700 volts, depending on the thickness of the coating.

Test panels of hardcoated 7075-T6 and 6061-T6 aluminum at International Nickel Co.'s test station, Kure Beach, N.C., have shown no corrosion after 9 years of exposure to salt atmosphere. Panels of the same material are as good as new after 14 years of exposure in a semi-industrial area in Baltimore.

The coating is a dense, hard form of aluminum oxide. It's applied electro-chemically, like anodizing, by immersing in a cold acid bath and passing current through, but its resistance to salt spray corrosion far exceeds that of standard anodized coatings. The process was developed at the Martin Co., and is licensed by Alcoa to several companies, including Metal Finishers, Inc.

It takes about 70 minutes to build up a .002-in. coating, which is recommended for average use. Thicker coatings are applied when ex-



HARDCOATED insulators used in electronics assemblies.

WORKER removing parts from hard coating tank.

OPERATORS masking parts to confine hardcoating to prescribed areas.

treme resistance to corrosion or abrasion is required. For maximum resistance to salt water attack, the coating is sealed in 5% potassium dichromate solution, but this lowers its abrasion resistance.

The method is recommended for a wide variety of applications, where the lightness of aluminum needs to be combined with superior wear and corrosion resistance. Hardcoated aluminum alloys can replace brass, bronze and steel parts in sliding wear applications where loads are not so high as to brinnell the aluminum.

Typical suggested parts are precision dial mechanisms, movable parts on controls, switches, relays, connectors, cams, gears, pinions, turbine blades, swivel joints, pistons, molds, tools, rotor blades, bearing surfaces, insulation plates, impellers, hold-down clamps, and anti-seize on threads.

The cost is comparable to that of applying hard chromium plate, but it varies with thickness of coating, amount of masking required, and the size and number of parts to be run. Martin hardcoating works with most aluminum wrought alloys, including all Alclad alloys, and with cast alloys such as 43, 142, 195, 218, 220, 355, A355, and 356. It's not recommended for alloys with high copper or silicon content, such as 2011, 2014, 2017, 2018, or 2219.

Galvanic action will cause corrosion when Martin hardcoated parts are in contact with dissimilar metals (iron, steel, stainless steel, copper) in the presence of moisture or salt water. So, such combinations should either be avoided, or adequate insulation should be provided. The coatings are also attacked by strong acids and alkalis.

The process has excellent throwing power and produces uniform coatings over intricate surfaces. By masking, it can be confined to prescribed areas, but this increases the cost. Since it is very hard to work, it should be applied after all forming, machining, sanding, welding, heat-treating and anodizing are finished. However, parts can be drilled, lapped, honed, or ground after hardcoating.

Approximately half of the Martin hardcoating penetrates the surface of the treated part, and the remainder produces surface growth. So, if a .002-in. coating is desired on close-tolerance parts, the parts should be .001 in. undersize before hardcoating.

Allowances also have to be made for internal and external threads. Major and minor diameters will double the amount of the coating growth. The pitch diameter for threads having an included angle of 60 deg. will increase four times the amount of the coating growth. For other threads, the pitch diameter will increase by twice the growth divided by the sine of ½ the included angle.

In normal thicknesses, the coating will not chip, flake or peel; but heavy coatings can be chipped on sharp edges, so these should be broken. On bending, the coating will spall on the compression side and crack on the tension side.

Color of the coating varies with the base alloy and the thickness applied. It's dark, almost black, on alloys containing copper, silicon, or magnesium, such as 6061, 7975, 2024, or 5052. On Alclad, it's golden tan. Because the coatings are inherently dark, they are not recommended for dye color impregnation. But they do offer an excellent base for all types of paints, films and adhesives.

Surface finish after Martin hardcoating is about 50 RMS, even on surfaces having a finish of from 2 to 32 before. So it's suggested that there's no need for a surface finish of better than 50 before hardcoating. For finer finishes, it's necessary to grind, polish, lap or hone after hardcoating.

The effect of the hardcoating on tensile and yield strengths of the basis alloys is negligible. However, fatigue life at high stress levels is cut in half. For 7075-T6, the endurance limit is 10,000 psi for a .002-in. coating.

The hardcoating has a lower coefficient of friction than the basis metal—about .12 in combination with commonly used alloys. This can be lowered to .03-.06 with dry film lubricants. Maximum resistance to sliding wear is obtained through use of molybdenum disulfide or graphite grease. Petroleum-base lubricants give relatively poor wear life.

Melting point of the coating is about 3700°F, so it can withstand extremely high temperatures for short periods before the base alloy melts.

Circle No. 8 on Reader Service Card

LEVELMAX BRIGHT NICKEL

BRIGHT, HARD, SMOOTH FINISHES

on rough, dull, unbuffed surfaces

Levelmax — the bright nickel process — reduces or eliminates surface buffing and polishing, simplifies chrome plating, makes possible bright plating of hard-to-buff areas. You get bright, smooth nickel coatings on poorly polished steel, unbuffed stampings and castings and dull copper plate. Levelmax is simple to control, has high tolerance to organic and metallic contamination, can be used under standard plating conditions. Levelling action is excellent. Levelmax bright nickel takes chrome easily. The Levelmax process is the most versatile of the nickel processes for varied product shapes, base metals and applications.

For complete working details, write on your company letterhead for Bulletin 191, Levelmax operating manual. Write Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y., or call your nearest Federated sales office.

ASARCO

Circle No. 38 on Reader Service Card

For Over 20 Years
Manufacturers of

METAL POWDERS

ALUMINUM
BRASS • COPPER
FLAKE, GRAIN AND ATOMIZED FORMS

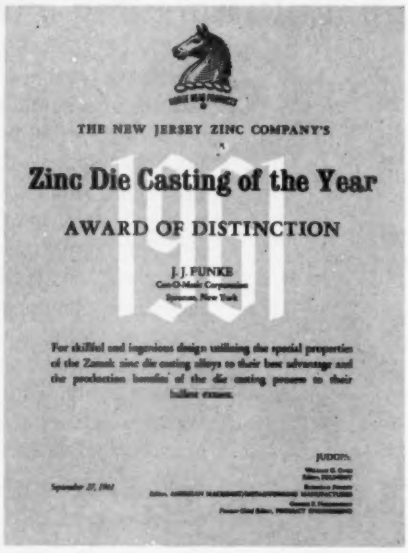
magna

MANUFACTURING COMPANY, INC.
Plant: HASKELL, NEW JERSEY
TEMPLE 5-1200. CABLE:"MAGNAFLAKE"

Circle No. 62 on Reader Service Card

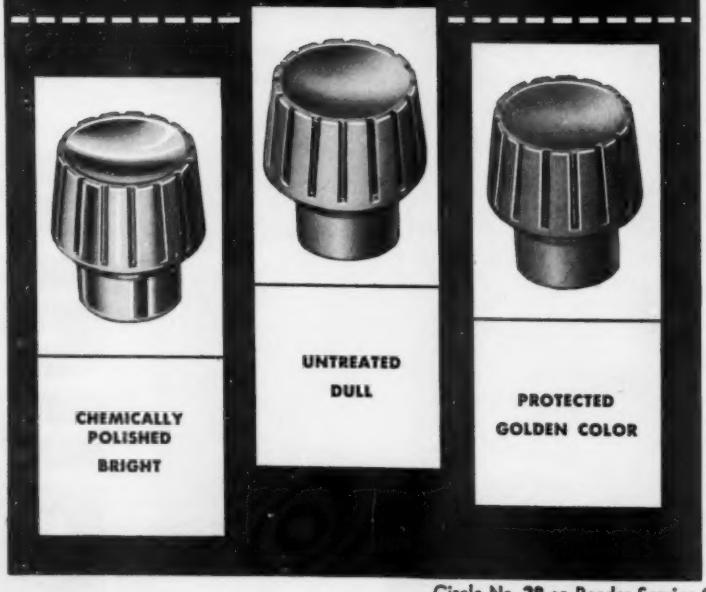
PICK A WINNER

ZINC AND ALUMINUM DIE CASTINGS



CAST-O-MATIC CORPORATION
Box 1172, Syracuse, N.Y.
Phone HEmpstead 7-8441

DURACOAT®



For chemically polishing, deburring and protecting zinc and aluminum die castings

DURACOAT® DCP-3 and -5. Zinc die cast parts can now be chemically polished by simple immersion. Costly hand or mechanical operations can be eliminated or supplemented with these solutions. Use for reclaiming stripped parts; prior to plating for brighter deposits and increased throwing power into low current density areas, and as a final finish.

CHEMBURR® 3 and 5. For chemically deburring zinc die castings. Eliminates costly mechanical tumbling and hand deburring operations. Internal holes and threaded sections completely deburred and chips removed by simple immersion.

DURACOATS®. Liquid and powdered chromate products for producing bright, irridescent or golden protective finish on zinc die castings. Fast, simple, economical to use. Highest quality at lowest cost.

ALCHROME® #1 and #2. Clear or yellow golden chromate finish for aluminum. Outstanding protection. Can be used to replace anodizing where hardness is not a requirement.

All **DURACOAT®** products meet existing military specifications.

Write for free technical data sheets describing products in detail. Send samples for free processing.

HEATBATH CORPORATION
SPRINGFIELD 1, MASSACHUSETTS
or 701 North Sangamon Street, Chicago 22, Illinois

39 Years of Service to the Heat Treating and Metal Finishing Industry

Circle No. 28 on Reader Service Card

promotions & changes

Continued from page 9

National Lead Co., Doehler-Jarvis Div.—*R. Gordon Roesler* has been named sales manager. He was formerly assistant sales manager. *Charles R. Gochnauer* now assumes the post vacated by Roesler. He was formerly sales administrator.

The Diversey Corp.—*Allan Elston* has been promoted to eastern regional sales manager, and will be responsible for the Eastern and New England Divisions. He was formerly manager of Diversey-Wilmington in Sao Paulo.

Aluminum Extrusions, Inc.—*D. E. Gill* has been appointed sales manager of the Extrusions Division, and *W. G. James* has been named sales manager of the Fabrication Division. These are two new sales divisions created by AE to meet the demands of increased sales.

GILL

JAMES

Gill was formerly the firm's Chicago Division sales manager, and James was previously with Hayes Industries.

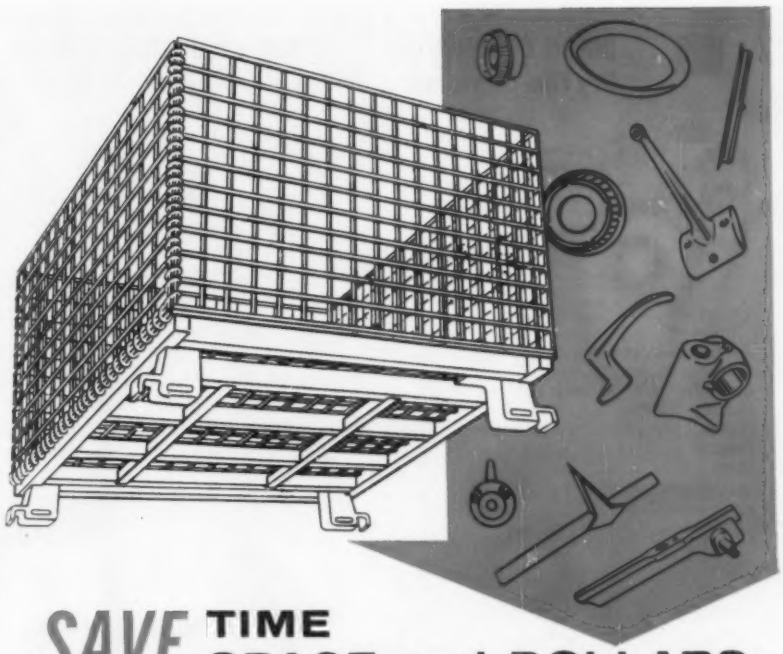
Oakite Products, Inc.—*Richard F. Latt* and *Donald F. Moulton* have been appointed to the firm's field service organization.

Chicago White Metal Casting, Inc.—*Harry E. Blasingham, Bill Broxterman,* and *R. E. "Tim" Dahlin* have been appointed as sales and engineering representatives. Blasingham will cover Indiana, and Broxterman will serve Southern Ohio and Northern Kentucky. Dahlin will be responsible for Texas, Oklahoma, and Southern Kansas.

Quaker State Metals Co.—*James R. Anderson* has joined the sales organization. He was previously assistant sales manager for R. G. Le Tourneau Co.

Baldwin-Lima-Hamilton Corp.—*Edward J. Doolittle* has been appointed product sales manager for the company's Industrial Equipment Division at Eddystone, Pa. He will supervise sales of compacting and steam platen presses. Previously, he was sales engineer for the firm's Pittsburgh District Office. He will reside in Wallingford, Pa.

DOOLITTLE

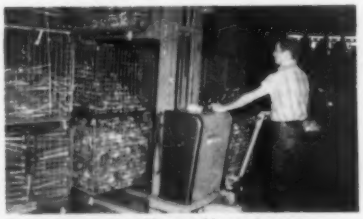


SAVE TIME SPACE and DOLLARS FOR DIE CASTING PLANTS . . . . . EVERYWHERE!

USP PALLETAINERS

Palletainers have simplified material handling problems for Die Casting plants and foundries from coast to coast. These versatile, practically indestructible containers will save time, money and manpower on the production line, in storage and shipping. And . . . Palletainers carry loads of 500 to 6,000 pounds with perfect safety. Form-welded steel legs provide 8-way entry for fork trucks and safe, ceiling-high stacking. Full visibility permits speedy inventory and the sturdy welded steel mesh protects cargo perfectly.

No matter what you manufacture—store or ship, *you need Palletainers!*



Palletainers simplify working storage—save valuable floor space. Stack safely with contents visible.

Palletainers afford a versatile warehouse bin arrangement. Palletainers with side or end gates may be opened or closed without affecting rigidity of stack.

SPECIAL OFFER

You can try Palletainers right in your own plant on a 60-day memo billing basis. Your obligation is freight only!

UNION STEEL PRODUCTS CO.

550 N. Berrien St., Albion, Michigan

Gentlemen: Please send me complete information on USP Palletainers. ☐

Please have a USP Material Handling Engineer contact me at once. ☐

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

Circle No. 55 on Reader Service Card

DIXON GRAPHOKOTE Dry Film Lubricants

For
- Flask Pins and Snap Flask Parts
- Coating on Aluminum Dip Ladles
- Core Box and Pattern Parting Agent
- Monorail Tracks and Frogs
- Sand Conveyor System Parts
- Base Block Release Coating
- Lift Truck Guides
- Pattern Shop Equipment
- Chill Coating

An easily-applied liquid, dries quickly to form a hard, smooth lubricating graphite film on any surface where sliding friction is a problem. Withstands above-normal temperatures. Doesn't pick up dirt, sand or abrasive dust.

Instant drying #220 packaged in 16 oz. aerosol cans. Graphokote #95 paint consistency in qts., gals., 5 gals. and 55-gal. drums.

DIXON GRAPHOKOTE No. 74 Lubricating Graphite in Water

For
- Permanent Mold Coating
- Die Casting Release Coating
- Extrusion Die Coating
- Spot-Weld Coating
- Slush Mold Coating
- Forging Release Agent
- Core Release Coating
- Chill Coating

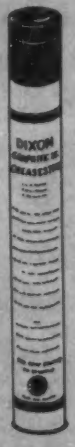
High quality graphite suitable for dilution in water. For brush, spray and dip applications. In qts., gals., 5-gal. and 55-gal. drums.

DIXON GRAPHOKOTE No. 1 Natural Colloidal Graphite in Oil

For
- Core Oven Chains and Bearings
- Automatic Plungers
- Die Casting Molds
- Permanent Mold Slides
- Shell Molding Machine Parts
- Kiln Car Bearings
- High Temperature Chains and Moving Parts

A new colloidal suspension of high purity *natural* graphite in oil, approved for use in automatic lubricating spray systems. Contains 10% by weight lubricating graphite and may be diluted with oil, kerosene and other hydro-carbons. Does not settle. In 1-lb. and 8-lb. cans and 40-lb. buckets.

DIXON '678' GRAPHITE LUBRICATING STICKS



For
- Band saw lubrication. Blades run smoother, last longer and give better cuts on castings and other metal stock.

A solid graphite formulation designed to provide maximum coating and lubrication under extreme heat and friction.

DIXON CARBOND CRUCIBLES and BASE BLOCKS For All Kinds of Melting

A modern Carbon Bonded product line, constructed to meet rapid thermal shock without damage, to heat faster and to resist oxidation in service. Dixon CARBOND CRUCIBLES and BASE BLOCKS are available in any size needed in Foundry operation.

DIXON GRAPHOKOTE No. 3 PLUNGER LUBRICANT Highest Quality Graphite

For
- Better Castings
- Longer Plunger and Sleeve Life
- Lower Costs
- Improved Operation

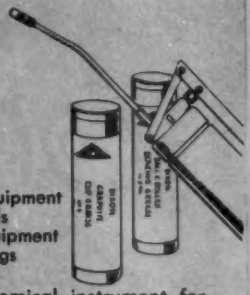
Reduces wear, prevents seizing, and galling, lowers friction when used on plungers of cold chamber die casting machines. In 25, 50 and 100-lb. drums.

DIXON GRAPHOKOTE No. 7 LUBRICANT (NON-FLAMMABLE)

For
- High Temperature Chains
- Permanent Molds
- Die-Casting Dies
- Shell Molding Machine Parts
- Forging Dies
- Oven Parts
- D/C Molds
- Extrusion Equipment Parts
- High Temperature Appliances

A dispersion of 10% Lubricating Graphite in synthetic fluid, suitable and approved for automatic spray applications. Produces a smooth, long-lasting, pure graphite coating when sprayed on hot surfaces. May be diluted with water, soluble oil, alcohol and similar vehicles. In 1 and 5-gal. cans and 55-gal. drums.

DIXON SPEED GUN and Grease Cartridges



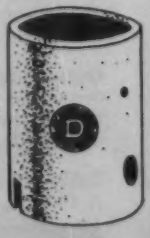
For
- Conveyor Equipment
- Machine Tools
- Handling Equipment
- Roller Bearings
- Ball Bearings

A clean, economical instrument for handling greasing problems. Develops 8000 lbs. pressure, suitable for Zerk & Alemite fittings. Eliminates the waste and grease contamination of hand-filled guns.

'No. 3' Cup Grease—A waterproof Graphite grease cartridge for damp area use.

'No. 375' Ball and Roller Bearing Grease—A high-temperature grease for bearing applications.

DIXON FURNACE LININGS and Silicon Carbide Covers



Linings tailor-made for *your* furnace or to fit all standard crucible designs. One-piece or in ring and sectional design. Cut installation time in half, lower fuel cost with faster melts, give longer service for lower maintenance cost.

Covers in all standard sizes or to meet *your* specifications; with flat or round groove. *Always uniform* for fit. Resist flame corrosion, minimize oxidation and cracking, keep heat *in the chamber* where it belongs.

DIXON SUPPLIES *COMPLETE* TECHNICAL DATA SHEETS AND DETAILED APPLICATION INSTRUCTIONS WITH *ALL* PRODUCTS.

Circle No. 64 on Reader Service Card

DIXON
PRODUCTS
do the job better
FOR THE
FOUNDRYMAN

For more than 100 years, *The Joseph Dixon Crucible Company* has been intimately associated with the development and growth of the foundry industries in America.

DIXON research and engineering resources have been constantly devoted to originating and perfecting *better products* for foundry use—both in refractories and in lubricants. Every DIXON product is field-tested in actual use for long periods of time *before it is offered to the trade.*

DIXON crucibles, stoppers, furnace linings and other refractory products, both graphite and carbon-bonded, are famous for their economy, long service and high quality performance.

DIXON Natural Graphite lubricants, in scores of forms and suspensions, are noted throughout the foundry world and are specified for their sure and inexpensive performance under the most difficult and exacting conditions.

There is a DIXON product to help every foundryman to do a better job. Some are listed on these pages—but there are many others.

If you have a problem, with melting or with lubrication, DIXON can help you find the answer. We have been finding the answers to foundry problems for more than 100 years, and our engineering research facilities today are unsurpassed in America.

So remember—whatever your foundry needs may be, you can get the answer from DIXON. Write for DIXON Foundry Brochure No. R 130 today!

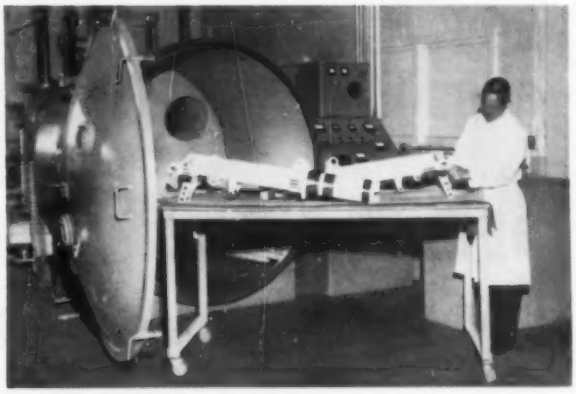
THE JOSEPH DIXON CRUCIBLE CO.
"Since 1827"
JERSEY CITY 3 / NEW JERSEY

D X N
EXCELLENCE SINCE 1827

casting about

Continued from page 14

Chamber Designed for Vac-Cad Process



The largest vacuum plating chamber designed for the Vac-Cad process is in operation at Anadite, Inc., a chemical milling and metal finishing firm in California. The chamber is designed primarily for the vacuum cadmium plating of strategic aircraft and missile parts.

Vac-Cad is a proprietary process which eliminates the potential for inducing hydrogen embrittlement in steel. In the past the aircraft industry was always faced with the possibility that a critical part such as a landing gear strut might be installed in a seriously embrittled condition.

Strategic parts that are processed in the chamber are landing gear sections, pressure vessels, springs, fasteners, and also lowly stressed steel such as thermostatic bellows where solution entrapment is a problem.

Problems of solution entrapment which eventually causes dissolution of the base metal are virtually eliminated because the throwing power of vacuum plating is superior to electrolytic plating.

Thickness of the coating can range from 0.0003" to 0.0015". Corrosion resistance of the Vac-Cad film exceeds that of electrolytic plating and meets military specifications for cadmium plating.

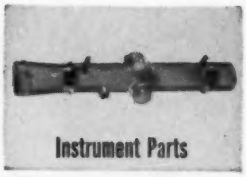
The Department of Defense has recently released Mil Spec MIL-C-8837 covering Vac-Cad plating.

Gold and Silver Used in Lubricant

Gold, silver and other precious metals are used in a new high temperature lubricant manufactured by General Magnaplate Corp. The lubricant, called Hi-T-Lube, is used for space capsules, jet engines, and other critical applications, but also has extensive applications in the general industrial field.

The durability of the lubricant is credited with being equivalent to the parent metal to which it is applied. It functions perfectly in temperatures up to 1200°F.

For your zinc or aluminum


Instrument Parts

Small Engine Cylinders

DIE CASTINGS CHOOSE ADVANCE

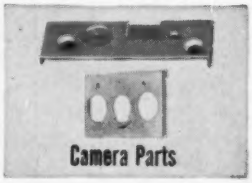
because . . .

above and beyond the measurable factors of metallurgical control and mechanical equipment (which others may also possess to a degree) there are at ADVANCE creative engineering, in-plant tool making, production skill and management attitudes toward customer requirements not always encountered in run-of-the-mill markets.

ADVANCE supplies zinc and aluminum components to fine product makers from Texas to Massachusetts as well as to its good neighbors in the Mid-west. Geographical distance is no barrier to quality production.

So . . . check with ADVANCE for your zinc or aluminum die casting requirements.

Motor Housings


Camera Parts

Control Valve Components

Valve Cases

These symbols are your assurance of highest quality control of zinc and aluminum alloys under ADCI standards

ADVANCE TOOL AND DIE CASTING CO.

38 years of service to industry

3782 N. Holton St.
Milwaukee 12, Wis.

Circle No. 2 on Reader Service Card

Circle No. 21 on Reader Service Card

Cleaning and polishing small component parts, instruments and control mechanisms.

Breaking edges, shaping to slight radius, touching-up and scores of other operations.

Relieving stress concentration and blending-in to reduce danger of fatigue failure.

PREDICTABILITY—
A Key to Reliability

Advanced technologies demand accurate predictions of performance in tools as well as materials. Predictability in tools used is basic to reliability in products made.

CRATEX RUBBERIZED ABRASIVES can be used with complete confidence. They will perform as expected—engineered for the most delicate and sensitive applications in **Deburring, Smoothing, Cleaning** and **Polishing.**

WHEELS, POINTS, BLOCKS, STICKS, CONES	Coarse (C)
	Medium (M)
	Fine (F)
	Extra-Fine (XF)

Sold through leading Industrial Supply Distributors

FREE! send for the new, informative 22 page Cratex Application Manual, including a complete illustrated catalog.

CRATEX
MANUFACTURING COMPANY, INC.
1600 Rollins Road Burlingame, California

Circle No. 23 on Reader Service Card

Ettco
DRILLING and TAPPING

Lead Screw tapping attachments and heads

Here's precision production! Complete uniformity with unskilled labor. The result is speed, accuracy and economy, regardless of quantity.

***Complete Line*-Ettco has the tool for your single or multiple small hole production job.**

ETTCO TOOL AND MACHINE CO., Brooklyn 37, N. Y.

news of industry & associations

Continued from page 9

Aluminum Smelters Institute elects Warner president

In a recent election, the Aluminum Smelter's Research Institute elected Donald H. Warner, of Aluminum & Magnesium, Inc., as its president.

WARNER

Robert K. Arundale of Wm. F. Jobbins, Inc., was elected vice president, and George M. Baumann of American Smelting & Refining Co.'s Federated Metals Division, was named treasurer. Carl H. Burton was re-elected secretary.

The Institute is now in its 31st year.

Precision Castings expands

Precision Castings Co. will invest more than a quarter of a million dollars in expansion that will increase the firm's Fayetteville plant capacity in the production of aluminum and zinc die castings. This, it is stated, will create at least 150 new jobs, and increase the company's payroll to more than 400 workers. The expansion will include the construction of a 15,000 square foot warehouse, and the addition of new machinery.

Precision was purchased by Fulton Industries in early 1960, and is operated by the parent firm.

GE selects Continental Metals as distributor

Continental Metals, Inc., Los Angeles, has been appointed as General Electric Company's west coast distributor for its vacuum melted super alloys.

Continental is presently stocking Rene 41, M-252, U-500, and Waspaloy in its plant at 7001 Santa Monica Blvd., Los Angeles.

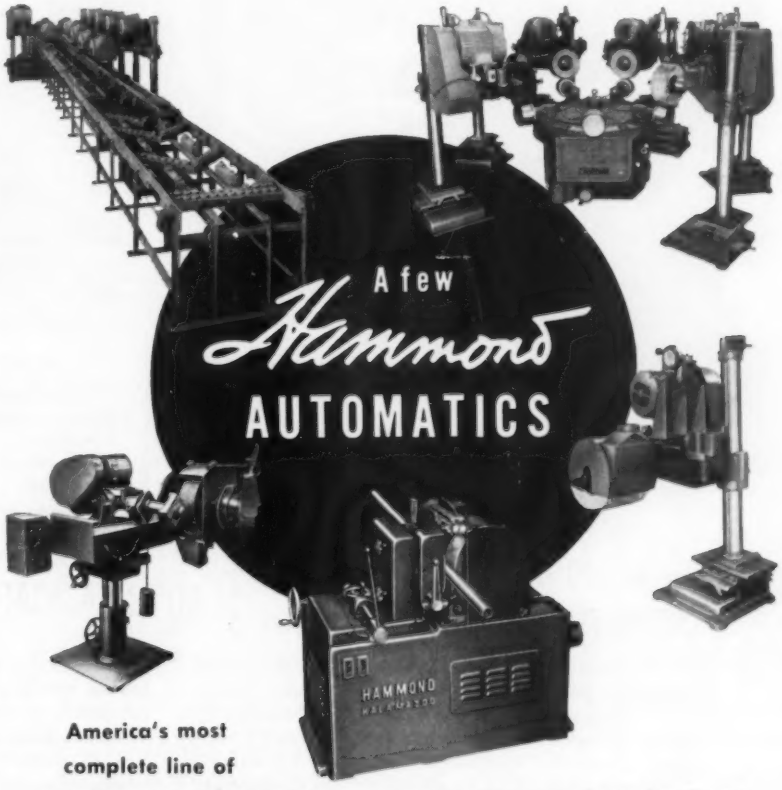
Report given at ADCI Annual Meeting

David Laine, secretary of the American Die Casting Institute, presented a report to the 1961 convention of the Institute, entitled "ADCI Speaks for the Custom Die Caster", highlighting ADCI activity during the past year.

Laine outlined ADCI's activities in connection with the Federal Government during the past year in relation to business and economic factors in the industry. He stated that tariff problems concerning the importation of zinc has again been dealt with by the ADCI, and expressed the hope that United Nations consultation on the matter might prove helpful. Laine said that since this could also become a problem with respect to aluminum, the ADCI had joined a committee for long range planning to alleviate such a situation.

According to Laine, the Institute represented the industry with draft proposals for revising Federal specifications for zinc base and aluminum die castings.

The problem of price-cutting was the final subject he reviewed. He stated that the only way for a healthy economy to exist within the industry is to eliminate unhealthy practices and to keep things on a basis of fair and legitimate competition.



America's most complete line of

POLISHING, BUFFING and DEBURRING MACHINERY

We offer a complete line of Turrets, both indexing and continuous, from 21" to 10' in diameter, and Strait Line conveyors in all styles and almost any length. The right finishing head for the job is available from 1 to 30 HP in floating or rigid types. Junior Automatics, "OD" Cylindrical Finishing Machines, and specials are available for high production finishing of household appliances, brass goods, automotive parts, plumbing supplies, etc. Ask for factory trained engineer to discuss your finishing problems — no obligation.

Hammond Machinery Builders INC

1642 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

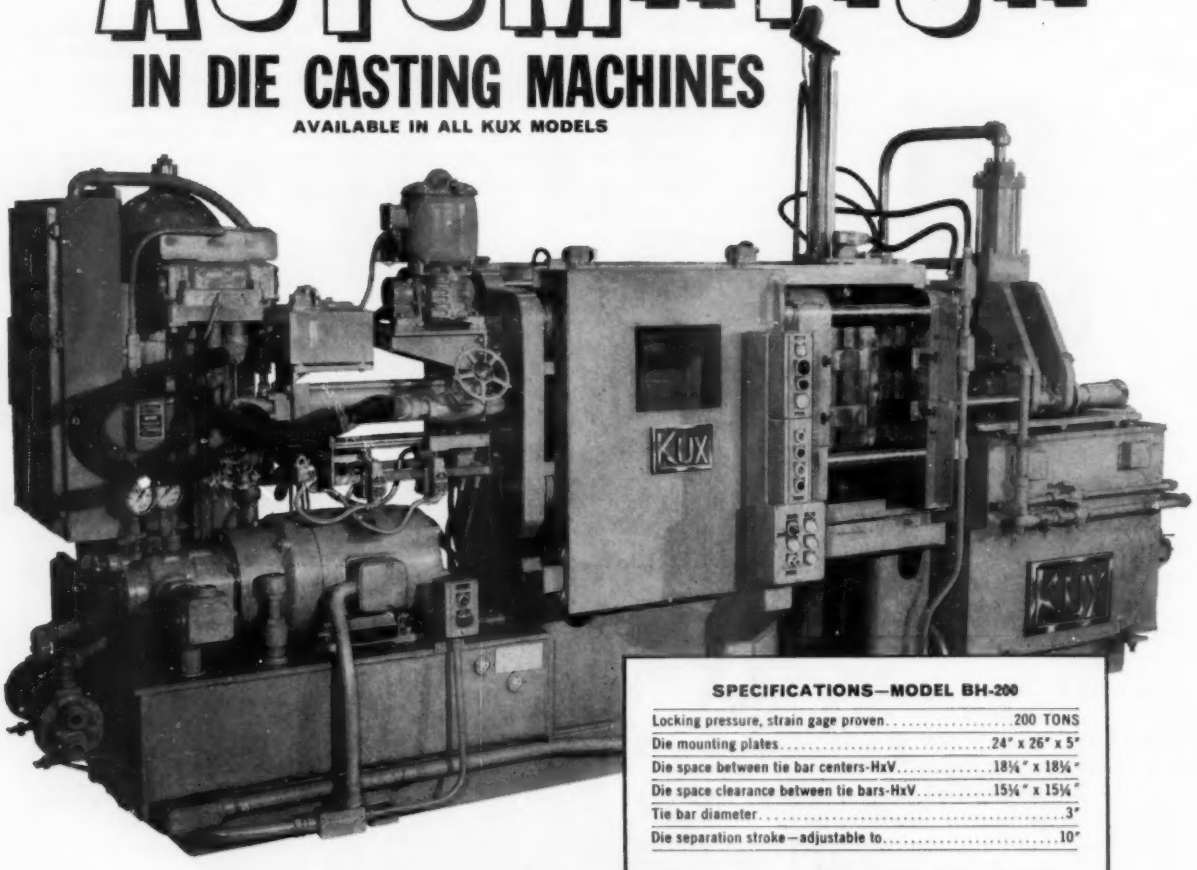
Circle No. 26 on Reader Service Card

Another **KUX** unsurpassed design superiority

AUTOMATION

IN DIE CASTING MACHINES

AVAILABLE IN ALL KUX MODELS



SPECIFICATIONS—MODEL BH-200

Locking pressure, strain gage proven	200 TONS
Die mounting plates	24" x 26" x 5"
Die space between tie bar centers-HxV	18¼" x 18¼"
Die space clearance between tie bars-HxV	15¼" x 15¼"
Tie bar diameter	3"
Die separation stroke—adjustable to	10"

Up to 900 free cycles per hour . . .
500 to 700 casting cycles per hour } AUTOMATICALLY — CONTINUOUSLY

You're looking at the new KUX Model BH200—the 200-ton strain gage proven hot chamber die casting machine, which will continuously produce vast quantities of hardware finish castings with minimum maintenance and down time. Automatic operating mechanism permits a cycle with a full 10" of die movement and 6" of metal injection stroke in 4 seconds. A 6¼ lb. zinc shot can be produced in this heavy duty machine at 1800 PSI injection pressure. Sensing safeties retract the die plate and prevent recycling of machine if there is flash on the die surfaces.

Incorporated into this machine cycling mechanism is a low pressure approach of the moveable die plate, flash sensing switches, air jets for cleaning die faces, casting sweep arm, and die lubricating unit with adjustable interval timing. Also available in cold chamber models for casting aluminum with KUX "AUTO-FEED" system of vacuum die casting.

ADDITIONAL FEATURES in the 28 all-new strain gage proven KUX models are the revolutionary "VAC-U-DIE" and "AUTO-FEED" systems of vacuum die casting—motorized die height adjustment mechanism—and the patented KUX injection pressure multiplier for cold chamber models with injection pressures up to 36,000 PSI and plunger speeds up to 12,000 inches per minute.

KUX MACHINE CO. (Dept. P)
6725 North Ridge Avenue, Chicago 26, Illinois

Write for full details of the 28 all-new KUX models illustrated in the latest KUX Die Casting Machine Catalog.

Circle No. 35 on Reader Service Card

PMM

data offered in this month's ads *qualified readers may obtain these free reference materials by circling the numbers on the reader service cards*

1. Solid Lubricants—Acheson Colloids Co.—Technical bulletin on parting agents and mold coatings for die castings.

3. Additives—Alan Wood Steel Co.—Technical bulletin gives data on the use of carbon additives to iron powder.

8. Nickel Plating—Levelmax Div., American Smelting & Refining Co.—Bulletin describes how to get bright plating on hard-to-buff areas.

11. Investment Casting—Arwood Corp.—44-page booklet includes practical tips on designing for investment casting.

12. Investment Casting—Atlantic Casting & Engineering Corp.—Information available on casting a full range of non-ferrous alloys.

14. Die Casting—B & T Machinery Co.—Technical information showing how to get quality die castings in volume quantities.

17. Pattern Waxes—Casting Supply House—Catalog describes how to speed production, lower costs, and increase dimensional stability with Yates pattern waxes.

18. Fire Resistant Hydraulic Fluids—Celanese Chemical Co.—Data available on fire-resistant fluid in six viscosity ranges.

21. Rubberized Abrasives—Cratex Manufacturing Co., Inc.—22-page Application Manual describes use of rubberized abrasives for deburring, cleaning, smoothing, and polishing.

22. Standard Unit Dies—D-M-E Corp.—Technical brochure on lower costs through standardization.

24. Extrusion Die Lubricant—Grafo Colloids Corp.—Booklet describes colloidal graphite lubricants for high temperature and high pressure applications.

OFFERED FOR THE FIRST TIME . . .

The services and reference materials listed here are being offered for the first time in this issue by new PMM advertisers.

52. Die Casting Dies—Supreme Impression & Mold Co., Inc.—Offers services of designing and building die casting dies.

25. Tiny Zinc Die Castings—Gries Reproducer Corp.—Bulletin includes designer's checklist for small zinc die castings.

27. Sintering—C. I. Hayes, Inc.—Bulletins on sintering furnaces designed for close control, dependable operation on control research or full-scale operation.

28. Chemical Finishing—Heatbath Corp.—Technical data sheets on chemically polishing, deburring and protecting zinc and aluminum die castings.

29. Melting Furnaces—Hevi-Duty Electric Co.—Bulletin describes Tagliaferri melting furnaces, including the 60-cycle non-ferrous induction furnace.

30. Investment Casting—Hitchiner Manufacturing Co.—Technical information on the ceramic shell method of investment casting.

35. Die Casting Machines—Kux Machine Co.—Catalog describes an entire line of die casting machines.

40. Investment Casting—Midwest Precision Castings Co.—Book—"How to Design Investment Castings" gives data on effective design for economical investment castings.

46. Lubricating Equipment—Pierce-Waller, Inc.—Information on lubricating, cleaning and cooling molds.

47. Powdered Metal Parts—Reese Metal Products Corp.—Brochure shows how to cut costs of precision parts with the Remet process.

49. Extruded Wax Shapes—Alexander Saunders & Co., Inc.—Price list available for variety of extruded wax shapes.

53. Pots—Pottstown Machine Co.—Brochure describes a line of melting kettles for lead, zinc, and aluminum.

55. Palletainers—Union Steel Products Co.—Information on Palletainers used for material handling of problem shapes.

56. Investment Castings—Vascoloy-Ramet Corp.—Data on investment castings made in metals to meet specific requirements.

57. Temperature Control—West Instrument Corp.—Data on complete line of temperature controllers and accessories.

58. Die Castings—Withrow Die Casting Co.—Illustrated brochure tells about company processes and and services.

60. Investment Castings—Casting Engineers, Inc.—Brochure tells how to cut costs by specifying investment castings.

63. Ceramic Preformed Cores—H. J. Sherwood, Inc.—Technical design data on preformed cores for intricate design applications.

64. Foundry Products—The Joseph Dixon Crucible Co.—Brochure describes line including lubricants, crucibles, furnace linings, and many others.

Redesigning and Improving Aluminum Sections is a Superior Specialty

*The control panel frame of the Caloric oven-broiler was causing a lot of production trouble—30% rejects. To solve the problem, Superior redesigned the extruded aluminum frame to make full use of a special aluminum wedge key. Result—this made the entire frame dimensions consistent. The outside appearance of the frame was unaltered in any way, and the over-all production costs were reduced for Caloric.

Under one roof, Superior's dependable craftsmen are experts at mitering, bending, riveting, drilling, countersinking and notching . . . not to mention their skill at painting, polishing, bright dipping, anodizing and etching all kinds of metals. Yes, all the finest quality of workmanship is still performed with a cost savings to you.

Send us samples, blueprints, or ask us to call. Superior engineers are ready to help you in many ways.

ALUMINUM EXTRUDERS • FABRICATORS • ANODIZERS • ARTRIM MOULDINGS

SUPERIOR INDUSTRIES INC.

3788 Oakwood Ave. • Youngstown, Ohio

Circle No. 51 on Reader Service Card

PMM

useful literature, catalogs, manuals *qualified readers may obtain*

any of these technical publications by circling the numbers on the reader service cards.

PROCESSES

150 *Extrusions*—JASCO ALUMINUM PRODUCTS—Facilities brochure for custom extruder of aluminum tells how huge die inventory may supply the shape you need.

151 *Powdered Metallurgy Parts*—RUSSELL, BURDSALL & WARD BOLT AND NUT CO.—Technical brochure explains the powder metallurgy process, lists design considerations for powdered metal parts.

152 *Investment Castings*—ARTCO, INC.—Technical booklet tells what tolerances to use on investment castings to reduce die costs.

153 *Extrusions*—PRECISION EXTRUSIONS, INC.—Technical booklet lists alloys, properties, tolerances, and pricing information for designers of extrusions.

154 *Steel Extrusions & Castings*—CURTISS-WRIGHT METALS PROCESSING DIV.—Brochure describes capabilities for making large, intricately shaped steel extrusions and castings.

MATERIALS & EQUIPMENT

155 *Inspection & Testing*—MAGNAFLUX CORP.—10-page booklet describes the fundamentals of a variety of methods for non-destructive testing and inspection.

156 *Vacuum Furnaces*—RICHARD D. BREW & CO.—Literature describes high temperature vacuum furnaces for sintering, annealing, heat treating, metal purification, nuclear processing, and physical testing.

157 *Cutting Oil*—SOCONY MOBIL OIL CO., INC.—Data on a cutting oil offering greater machine output, lower tool costs, and reduced loss from rejects.

158 *Production Fixtures*—ARTCO, INC.—Brochure describes services for designing and building production machines and fixtures.

159 *Sorting Units*—MAGNAFLUX CORP.—Bulletin describes instruments using eddy currents to detect changes in electrical conductivity, permeability, size, or to locate defects.

160 *Induction Melting Furnaces*—INDUCTOTHERM LINEMELT CORP.—Brochure describes new trends, ideas, and techniques to improve your melting processes.

161 *Conductivity Meter*—MAGNAFLUX CORP.—Bulletin describes an all-transistorized, battery-powered electrical conductivity meter.

162 *Furnaces*—HARPER ELECTRIC FURNACE CORP.—Specifications and application data on straight thru and hump type mesh belt, and dry hydrogen box furnaces.

163 *Skimmer Floats*—NATIONAL CARBON CO.—Catalog sheet describes graphite skimmer floats for pouring crucibles that permit the production of clean non-ferrous castings.

164 *Fire-Resistant Fluid*—SOCONY MOBIL OIL CO., INC.—Bulletin describes an emulsion type fire resistant fluid which provides safety and efficient hydraulic performance.

165 *Thermocouple Accessories*—NATIONAL CARBON CO.—Brochure lists specifications for graphite tapered plugs, threaded end bushings, sleeves, and plugs for sheathing thermocouples.

166 *Box Furnaces*—LINDBERG ENGINEERING CO.—Bulletin describes inert atmosphere and non-atmosphere box-type furnaces.

167 *Sintering Furnaces*—HARPER ELECTRIC FURNACE CORP.—Specifications and application data on box type and mesh-belt sintering furnaces.

168 *Inspection & Testing*—MAGNAFLUX CORP.—Brochure describes a 5-day training course in non-destructive testing and inspection presented at the Magnaflux plant.

169 *Box Furnace*—LINDBERG ENGINEERING CO.—Bulletin describes an atmosphere box furnace adaptable to a wide range of heat treating applications.

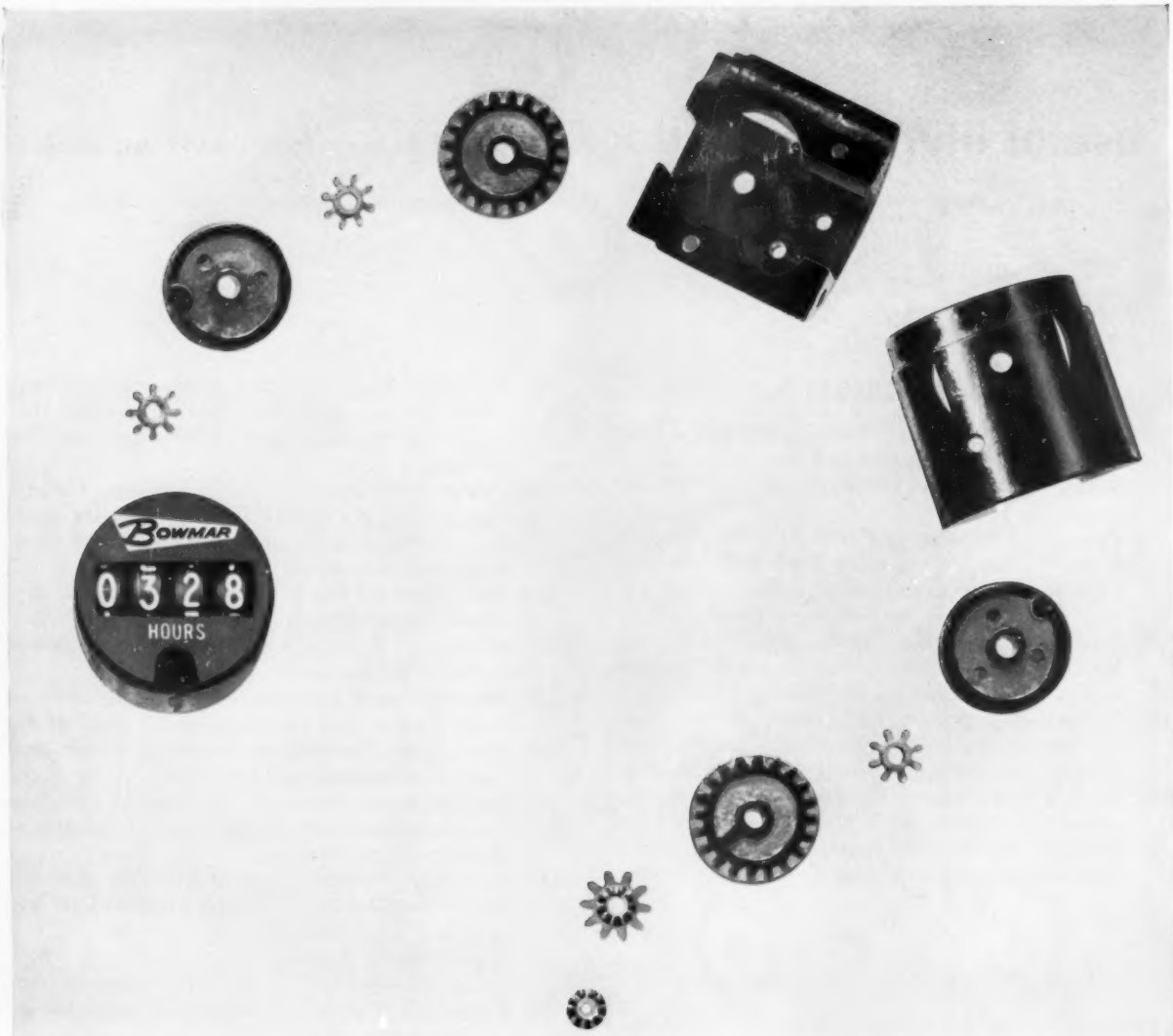
170 *Glass Cores*—CORNING GLASS WORKS—Bulletin tells how glass cores form precision holes in investment castings, eliminating costly drilling operations.

171 *Mold Release Agents*—GENERAL ELECTRIC CO.—Technical booklet lists complete data on silicone mold release agents for producing shell mold castings and die castings.

172 *Lubricants*—JOSEPH DIXON CRUCIBLE CO.—Bulletin describes specialized graphite lubricants for high temperature, heavy load applications.

173 *Boring Bars*—VASCOLOY-RAMET CORP.—Catalog describes boring bars with throwaway inserts that combine micro-adjustable features for quick, positive, accurate diameter adjustment in increments of 0.001", with the economies of throwaway inserts.

more on page 61



"are you getting your metal's worth?"

Without the castability and dimensional stability of Zamak, these almost microscopic gears and their precise housing would have been impossible to die cast. The eleven castings make up a counter assembly for an elapsed time indicator and together weigh less than half an ounce. A high degree of accuracy is essential. The ten-tooth bevel gear above the dime is just .063" in height. • Spectacular unit cost savings of 91.5% were achieved by zinc die casting, instead of machining the housing from aluminum bar stock and the gears and counter wheels from brass. All openings in the two-piece housing are die cast, even to the small crescent-shaped slots in the sides which permit the outermost gears to clear the housing wall. • This subminiature counter assembly is the heart of the Bowmar Instrument Corporation's Model 1440 Elapsed Time Indicator. It is a decimal type indicator, with numerals one-eighth inch high permitting readout up to six feet away. Standard, concentric circle-dial type indicators have numerals only a few hundredths of an inch high. • The Bowmar ETI must conform to military specifications and is used on digital computers such as the Army's FADAC (Field Artillery Digital Automatic Computer), where it determines the amount of time FADAC has operated, permitting equipment check-out at specified intervals. • These tiny castings demonstrate the tremendous versatility of the Zamak alloys, invented, pioneered and perfected by The New Jersey Zinc Company. Are you getting your metal's worth? To find out, write today to NJZ.

NJZ
THE NEW JERSEY ZINC CO.
160 FRONT STREET • NEW YORK 38, N. Y.

Die castings by Hadlock & Temte, Inc., Chicago

Circle No. 43 on Reader Service Card

useful literature, catalogs, manuals

174 *Tools & Dies*—GENTRY CARBIDE TOOL & DIE CO.—Brochure shows their facilities for making tools, dies, and special tungsten carbide products.

175 *Vacuum Pumps*—CONSOLIDATED VACUUM CORP.—56-page technical booklet provides complete operational technical data and specifications for high-vacuum vapor pumps.

FINISHING

201 *Plasma Spraying*—PRECISE METAL PRODUCTS CORP.—4-page brochure describes plasma spraying and generating equipment.

202 *Finishing Agents*—ENTHONE, INC.—6-page brochure describes plating chemicals, rust and scale removers, strippers, degreasers, coloring agents, and other metal finishing products.

203 *Coating Abrasives*—THE CARBORUNDUM CO.—20-page catalog lists discs, sheets, rolls, belts, sleeves, cones, molded discs and other accessories for the metal finishing industry.

204 *Vibratory Finishing*—ROTO-FINISH RANSOHOFF CO.—Literature describes a vibratory finishing machine with compound recirculating system that prevents abrasive impregnation of the work load.

205 *Barrel & Vibratory Finishing*—PANGBORN CORP.—Literature describes a line of media and compounds for barrel and vibratory finishing.

206 *Finishing Systems*—DESPATCH OVEN CO.—16-page brochure describes a complete line of products for finishing. Includes washers, ovens, spray booths, flow coaters, dip tanks, and conveyors.

207 *Vibratory Finishing*—VIBRODYNE CO.—Bulletins describe a line of electro-magnetically driven vibratory finishing machines. Low power requirements are a feature.

208 *Chromate Coatings*—PENNSALT CHEMICALS CORP.—Data sheet describes a new chromate surface treatment that provides exceptional corrosion resistance.

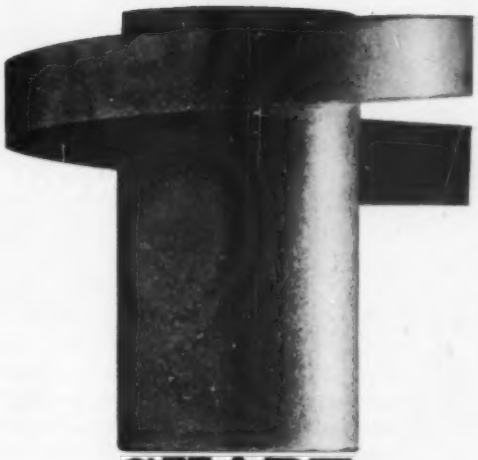
209 *Liquid Honing*—VAPOR BLAST MFG. CO.—Data sheets tell how liquid honing provides more economical deburring, improves chromium plated finishes.

210 *Vibratory Finishing*—PANGBORN CORP.—Brochure describes a line of vibratory finishing machines and accessories, including continuous processing units.

211 *Barrel & Vibratory Finishing*—ROTO-FINISH RANSOHOFF CO.—Brochure describes a line of barrel and vibratory finishing media and compounds.

212 *Spray Booths*—DESPATCH OVEN CO.—Bulletin describes a line of water wash and dry paint spray booths.

213 *Stripping Compound*—E. F. HOUGHTON & CO.—Data sheet describes a solvent stripping compound for the rapid removal of organic finishes.



SHAPE
+
SLIDE
+
SAVINGS

This distributor cam once posed a materials selection problem for the Pinspotters Division of American Machine and Foundry—a problem solved by nonferrous powder metallurgy. As originally designed, the cam was machined from steel, but AMF was looking for increased slide characteristics to prevent the galling and binding which tended to occur with steel-to-steel contact.

Oil-impregnated prealloyed bronze powder provided the self-lubrication required—as well as fatigue strength of 5000 psi and ultimate tensile strength of 18,000 psi. And despite the tricky compacting technique called for by the continuously curved outer section, International Powder Metallurgy of Ridgway, Pennsylvania produces this more efficient redesign at a **90% cost saving.**

Lower cost, improved performance, solution of a tough design problem—these are the advantages to be gained through nonferrous powder metallurgy. To find out how to put this material and method to work for you, write today for your copy of "Designing for Pressed Brass and Nickel Silver Parts."

NJZ
THE NEW JERSEY ZINC CO.
160 FRONT STREET • NEW YORK 38, N. Y.
Circle No. 44 on Reader Service Card

10 second expert

Trouble free operation of this Polaroid Land Camera is the result of improved materials engineering, made possible by the high strength and corrosion resistance properties of this stainless steel powder metal part (a lens board locking lever.)

A powder metal parts fabricator can help you to improve your materials engineering—resulting in better equipment performance, with production economies.

Hoeganaes sells sponge iron and high alloy powders to the powder metal parts fabricating industry—a precision industry that should be working for you. Contact your nearest powder metal parts fabricator. He will deliver promised results.

"The locking lever on the Polaroid Land Camera was manufactured by Dixon Sintalloy, Inc., Stamford, Conn., and used in Models 850 and 900."

HSIC

HOEGANAES SPONGE IRON CORPORATION

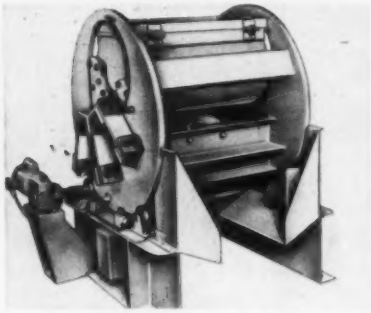
RIVERTON, NEW JERSEY

new products & developments

Continued from page 21

Vibratory barrel finishing machine

SYNTRON CO.—Model VB-6 has a capacity of 6 cubic feet. It deburrs, deflashes, polishes, or descales and features a push-button feature for rinsing or unloading. It completely finishes parts, rotates to the emptying position and the barrel tilts to facilitate unloading automatically.



The electromagnetic drive produces 3600 vibrations per minute to keep abrasive media working constantly.

Circle No. **240** on Reader Service Card

New tumbling shapes

ANTRO ABRASIVES, INC.—This new tumbling media of steel wool fibers plays a dual role, depending on the type of material being worked. The steel wool shapes produce fine satin or matte surface finishes with luster and high

color. They also remove tiny burrs from delicate screw machine products and similar parts. Even though these burrs may not exceed .002", the manufacturer claims that they will not remove stock.

Circle No. **241** on Reader Service Card

more on page 65

Gardsman by WEST

TEMPERATURE CONTROLLERS

serve your need Best

General characteristics: indicating *and* providing positive control; distinctively simple, convenient, reliable, economical; tubeless; plug-in meter units; thermocouple break protected; guaranteed; demonstrated and serviced from offices in many cities here and abroad.

MODEL J SERIES

for Off-On control

MODEL JP SERIES

for Proportioning control; more precise where heating-cooling factors are more dynamic

MODEL JL SERIES

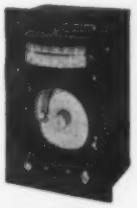
combines High Limit and Off-on control

MODEL JE SERIES

Portable—ideal for laboratories

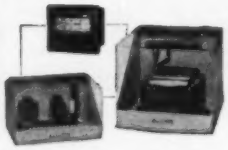
MODEL JG SERIES

provides Program control, applying any of above control actions to control both time and temperature.



MODEL JSB SERIES

gives Stepless control; extremely precise



MODEL JT SERIES

gives 3-Position control for motorized valves, 3-phase heating, heating-cooling cycles

WEST Instrument CORPORATION

All controllers can be furnished for thermocouples or resistance bulbs. For data on these or other West instruments and accessories, use your classified phone directory or write direct.

the trend is to WEST

SUBSIDIARY OF GULTON INDUSTRIES, INC.

SALES OFFICES IN WORLD'S PRINCIPAL CITIES

4357D WEST MONTROSE AVENUE, CHICAGO 41

Represented in Canada by Davis Automatic Controls, Ltd.

Circle No. **57** on Reader Service Card

Circle No. 31

Where Structural Qualities Are <u>Most</u> Important

ZINC DIE CASTING

OFFERS MORE IN

COMPACTNESS
STRENGTH
STABILITY

	ZINC SAE 903 ASTM XXIII (Zamac 3)	THERMOPLASTIC RESINS: POLYACETAL (Delrin® Type)	THERMOPLASTIC RESINS: ABS (Cycolac† Type)
COMPACTNESS			
EQUIVALENT VOL. TO STRENGTH RATIO	1	2.4 X	2.8 X
STRENGTH			
TENSILE			
1000 psi @ 70°F	41	10	5.1 - 7.8
212°F	28	4.5 - 5.5	(@ 160°F) 2.9 - 4.6
IMPACT			
ft.-lbs./in. @ −40°F	2	1.2 - 1.8	1 - 2.5
@ 73°F	43	1.4 - 2.3	3 - 9
	Un-notched Charpy	Notched Izod	Notched Izod
COMPRESSION			
1000 psi	60	12 - 18	2.5 - 11
STABILITY			
COEF. OF LINEAR EXPANSION PER °F	.0000152	.000045	.000078 - .00010
WATER ABSORPTION 24 hr. Immersion in %	0	0.12	.2 - .3
MOLD SHRINKAGE in./in.	.004	.020	.005

ABOVE DATA COMPILED 9/61

ST. JOE ZINC 99.99+%

ST. JOSEPH LEAD CO.

250 PARK AVENUE • NEW YORK 17, N.Y.

Plus these zinc die casting extras:

- Zinc is scratch resistant
- Zinc has far superior fatigue strength
- Zinc dies are easier to produce
- Zinc die casting has shortest moulding cycle
- Zinc can be machined by any method without fire hazard
- Zinc is highly resistant to stains
- Zinc can be readily colored and has excellent color retention

°REG. TRADE MARK OF E. I. DU PONT DE NEMOURS & CO. (INC.)

†REG. TRADE MARK OF MARBON CHEMICAL DIVISION, BORG-WARNER

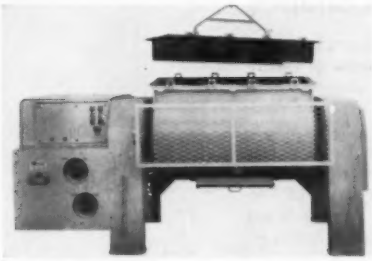
ZN-302

new products & developments

Continued

Combination finishing unit

B. W. MCINTYRE CO.—This combination vibratory tub and barrel unit has a cylinder 30″ in diameter



by 48″ long and is lined with ½″ neoprene. Eccentrics are adjustable, and weights may be added, giving widely variable frequency and amplitude. Trouble-free rubber mounts let equipment operate effectively with up to ¾″ misalignment. Larger units are built to order.

Circle No. **243** on Reader Service Card

more on page 67

POWDER CONDITIONING AND PROCESSING

METALLIC AND NON-METALLIC POWDERS GROUND TO YOUR SPECIFICATIONS

- IRON POWDER
- FERRO PHOSPHOROUS
- FERRITES
- MILL SCALE
- COPPER
- TUNGSTEN
- COBALT
- NON-METALLICS
- SOLID CHEMICALS

SCREENING AND PARTICLE SIZE CLASSIFICATION

OPEN TIME AVAILABLE

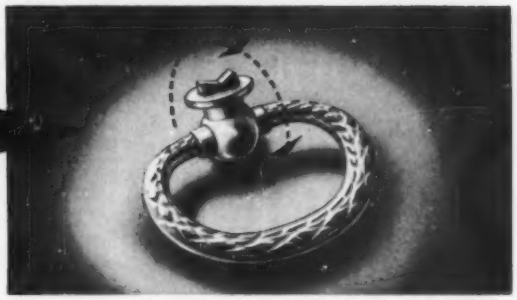
MICRO METALS CORPORATION

99 President St. Passaic, N. J.
Dept. No. 3A
Member Metal Powder Ind. Fed.

Circle No. **39** on Reader Service Card

Circle No. **25** on Reader Service Card

another unique **GRC die cast** zinc alloy component



this movable Intercast® element unit was **cast-assembled in one operation by GRC**

GRC's unique patented INTERCAST method die casts multiple-part zinc-alloy units with moving elements in a single, automatic, time saving, money-saving operation . . . even continuously interlocked assemblies. Units leave the machine complete . . . no trimming, no assembly, no machining needed. This INTERCAST technique is an ingenious refinement of GRC's exclusive method of small parts die casting—providing broad design latitude, close tolerances, economies in quantities of 100,000 and more.

Let GRC solve your problems. No size too small. Maximum length 2", maximum weight: ½ oz. ***Send TODAY for samples, prices and fact-filled bulletin.***

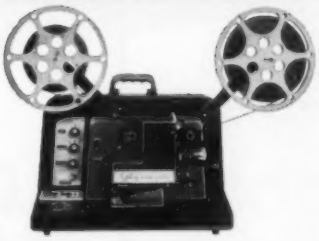
World's Foremost Producer of Small Die Castings

GRIES

GRIES REPRODUCER CORP.

157 Beechwood Ave., New Rochelle, New York • (914) NEw Rochelle 3-8600

6th IN A SERIES of POWDERED METAL PARTS applications by REESE



GRAFLEX chooses **REESE** POWDERED METAL PARTS

In its all new 16 MM Galaxy Projector, Graflex, Inc. employs 4 powdered metal parts by Reese. Here's why: Complex configurations are "naturals" for powder. Even with tolerances held to .0005", costs are anywhere from 50% to 80% less than in machined parts. And the Reese laboratory assures the best alloys for dimensional stability, strength, wearability, etc. Reese oil impregnation, when desired, also offers permanent self-lubrication. Investigate all the advantages of Reese powdered metal parts.

FREE BROCHURE

"How to Cut Precision Parts Costs with the Remet Powdered Metal Process" shows how Reese can help you. Send for your copy today.

REESE

METAL PRODUCTS CORPORATION

537 Howard Ave., Lancaster 10, Penna.

FOR **LOW COST** AND **DIMENSIONAL STABILITY**

Gears • Pinions • Cams
Ratchets • Bushings
Machine and Structural Parts in
COPPER • BRASS • IRON
ALLOY STEEL • NICKEL SILVER
COPPER INFILTRATED IRON

Circle No. **47** on Reader Service Card

LOWER your PIECE COST with ATLANTIC PLANAR INVESTMENT CASTING

- ▶ Up to 300 PIECES PER MOLD
- ▶ UP to 80,000 PIECES PER DAY
- ▶ TOLERANCES for CRITICAL DIMENSIONS to ± .003
- ▶ SURFACE FINISHES AS CAST to 125 MICROINCHES or BETTER
- ▶ BURN-OUT, BREAK-OUT and CUT-OFF TIME CUT IN HALF
- ▶ FULL RANGE OF NONFERROUS ALLOYS for EXCEPTIONAL STRENGTH, CORROSION RESISTANCE and LIGHT WEIGHT.

write or phone for complete information . . . prints will bring a prompt quotation

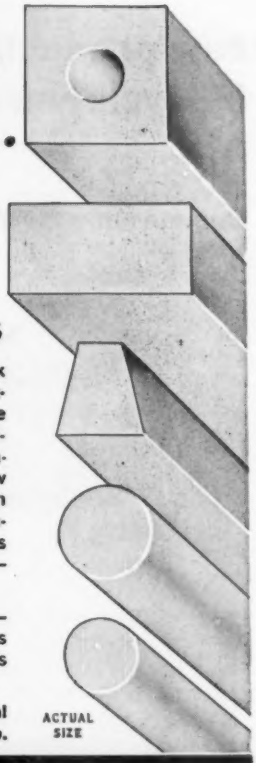
ATLANTIC
CASTING & ENGINEERING CORP.
810 Bloomfield Avenue / Clifton, N. J. / PRescott 9-2450

Circle No. 12 on Reader Service Card

Circle No. 49 on Reader Service Card

Save time... Save labor...

In Wax Pattern Assembly with SAUNDERS Extruded Wax Shapes



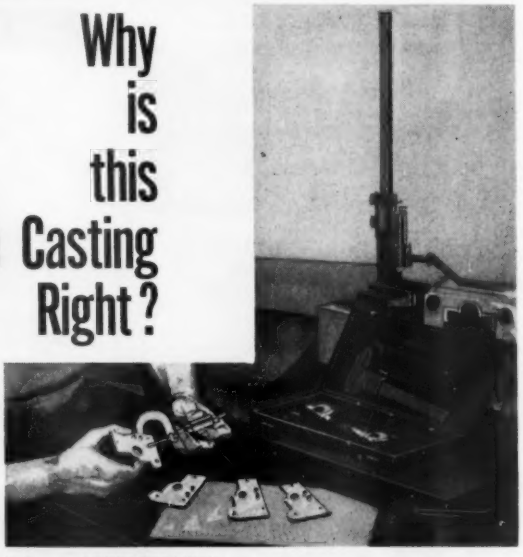
These Economical Extruded Wax Shapes, for central sprues of investment casting pattern clusters, have high tensile strength, excellent flexibility and provide easy pattern attachment. The Wax is an entirely new formula selected to retain strength and form over a wide range of seasonal temperatures — Rapidly melts out of shell or monolithic molds — not a reclaimed wax!

Sizes now available — 3/8" round — 1/2" round — 3/4" x 3/4" cored squares — 1/4" x 1/2" wedges — 1/2" x 1" solids . . . 24" lengths.

Write today for price list, or send trial order for 12 of each shape . . . $9.50 pp.

Alexander Saunders & CO., INC.
95 Bedford Street, New York 14, N. Y.

Why is this Die Casting Right?



It's a WITHROW casting thoroughly inspected to meet customer requirements.

send for our illustrated brochure

ALUMINUM · ZINC · BRASS ALLOYS
Die Castings & Vacuum Die Castings
No Minimum Size

WITHROW
DIE CASTING COMPANY
13164 Leadwell St. · North Hollywood, Calif. · Phone TRiangle 7-0414

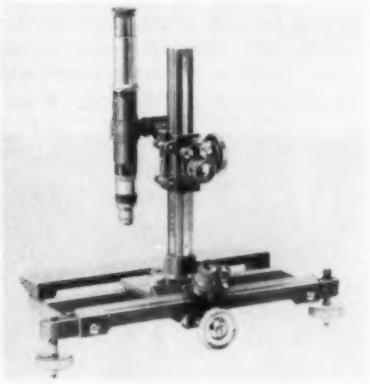
Circle No. 58 on Reader Service Card

new products & developments

Continued from page 65

Cathetometer

NATIONAL INSTRUMENT CO.—This new, dual purpose Comparator and Coordinate Cathetometer rapidly



and accurately locates inaccessible holes in large or small castings, measures deformation of materials under stress, and also measures dimensional changes due to thermal expansion, strain and other forces.

It has a horizontal range of 9.0" and a vertical range of 7.0". Both scales can be read directly to 0.0004" through a 50x telescope-microscope.

Circle No. **238** on Reader Service Card

Tablets control deoxidation

FOSECO, INC.—"Pelloid" tablets, a new chemical process for controlled deoxidation of red brass, commercial copper or tin bronze melts, or for increasing the fluidity of yellow brass or phosphor bronze melts, are fast and easy to use. They provide complete and accurate production control while eliminating spillage and weighing-out of bulk materials. The tablets are simply placed in the bottom of the ladle prior to pouring in the melt.

The one-ounce tablets are wrapped in pairs in protective lead foil and shipped in 125-pound pails. They are priced competitively with conventional deoxidizing methods for economical use.

Circle No. **239** on Reader Service Card

more on next page

Call on us for BOTH...

carroll

DC CREEK KENT DC

donald carroll metals inc.
201 north division street
bensenville,* illinois

POrter 6-5500

ZINC & ALUMINUM ALLOYS

ENGINEERED TO GIVE YOU
- HIGH FLUIDITY
- SUPERIOR FINISH
- DENSE CASTINGS

* ADJACENT TO O'HARE FIELD & ILLINOIS TOLLWAYS

Circle No. **16** on Reader Service Card

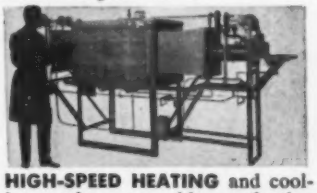
Ed Johnson, Furnace Application Engineer, talks about

SINTERING CERMETS

Whether you're working with cermets, ceramics, refractory metals, or stainless steel powder compacts, Hayes has the *right* furnace and the *right* atmosphere to give you best results at lowest cost.

PRECISE SINTERING TEMPERATURES are important for effective bonding of compacts. The Hayes Type M-Y High-Temperature Furnace provides the exact, uniform heating required — has straight-through design for easy operation.

ECONOMICAL, TOO, the Hayes Type M-Y furnace needs only modest power input for temperatures to 3300°F with Moly elements. It can be used with reducing atmospheres for close control research or full-scale production, and is available with metallic or ceramic superhearths.



HIGH-SPEED HEATING and cooling cycles mean big production with the Hayes Model HT/HV Vacuum Furnace. A full-production size vacuum furnace, this Hayes unit is cold-wall designed for compactness as well as operating comfort. Heat-up to 3000°F range and over in minutes, with low voltage elements. High vacuum to 0.1 micron . . . low leak rate.

THE RIGHT ATMOSPHERE is available from the complete Hayes line —ammonia dissociators, endo and exo generators, nitrogen and forming gas generators, gas dryers — all designed for controlled, dependable operation.

WHATEVER YOUR SINTERING PROBLEM — for production, high temperature or research sintering, Hayes know-how and equipment can supply you with a Results Guaranteed answer . . . tested in our lab on shop-scale equipment, and proved by scores of similar installations in industry. Write for bulletins on Hayes sintering furnaces. C. I. Hayes, Inc., 819 Wellington Ave., Cranston 10, R.I.

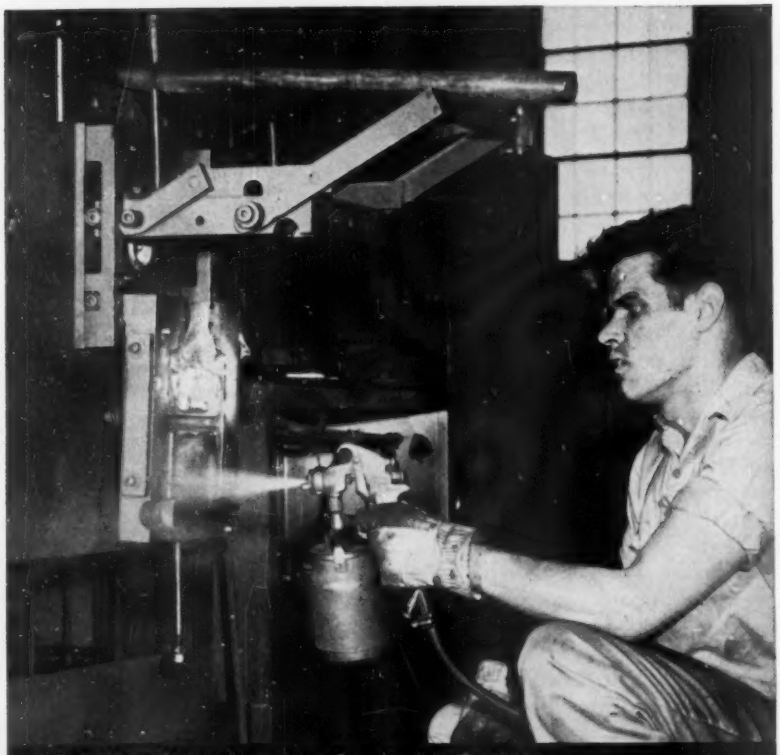
C. I. HAYES, INC.

Established 1905

It pays to see Hayes for metallurgical guidance, lab. facilities, furnaces, atmosphere generators, gas and liquid dryers, Pow-R-Trol (TM) control units.

Circle No. **27** on Reader Service Card

DIE CASTING REPORT



Application: *Aluminum Gravity Die Castings.*
Problem: *To obtain a micro-smooth surface finish.*
Solution: *'Aquadag'® and 'dag'® Dispersion 193—diluted with water in varying ratios depending upon the job requirements; spray-applied.*

RESULT: *SURFACE FINISHES ON ALUMINUM CASTINGS AS SMOOTH AS 40 to 60 MICROINCHES*

Akron Gravity Die Casting Company, Akron, Ohio, has built a reputation on products with exceptional surface quality. These micro-smooth finishes . . . comparable to a tool room grind . . . have been insured by using Acheson's 'Aquadag' as a parting agent and 'dag' 193 as an insulating coating. By using the materials in these separate functions, Akron Gravity is able to achieve proper metal flow throughout the die cavity — eliminating deposit build-up, premature solidification, and metal-to-metal alloying. As a result they get both better casting surface finishes and longer die life.

The consistent uniformity, quality performance, and versatility of Acheson mold coatings for metal casting, are covered in Bulletin No. 425. Send for your copy, care of Dept. PMM 121,

ACHESON—First name in solid lubricants for fifty-four years.

ACHESON Colloids Company

PORT HURON, MICHIGAN

A division of Acheson Industries, Inc.

Sales offices in principal cities

Also Acheson Industries (Europe) Ltd. and affiliates, London, England

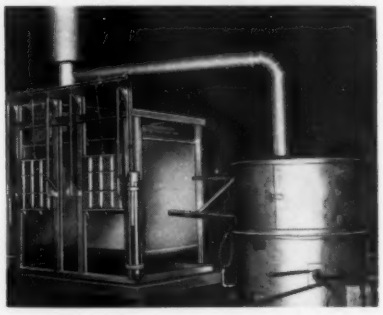
Circle No. **1** on Reader Service Card

new products & developments

Continued

Sweat furnace

WARWICK INDUSTRIAL FURNACE & ENGINEERING CORP.—This combination sweat and holding furnace is designed for reclaiming metals that are bonded to other metals. In the sweat furnace, the metal with the lowest melting point drains off into

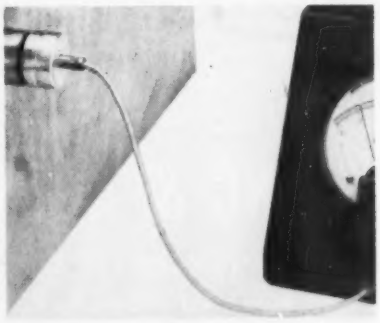


the holding furnace, thus separating the two metals. This combination is excellent for reclaiming die castings with steel inserts, permanent mold castings such as automotive pistons with steel struts, and many other uses.

Circle No. **242** on Reader Service Card

Thermocouple

THE ADVANCED PRODUCTS CO.—The Monitemp Mark IV makes it possible to read the surface temperature of any magnetic surface quickly and accurately without



marring the surface through the use of an Alnico V magnet.

Conductor wires are available in any length, and are protected by a stainless steel braided sheath.

Circle No. **244** on Reader Service Card

PMM

opportunities

jobs and equipment

Opportunites rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Road, Cleveland 15, Ohio. Closing date for ad insertions: 1st day of month preceding publication.

POSITION OPEN

Firm of manufacturers' representatives desire responsible source of supply for aluminum and/or zinc die castings for Michigan and Ohio. Have sold substantial volumes of these castings to automotive and appliance industries. Box 11761.

WANTED — Metallurgist for leading east coast multi-plant Investment Casting Company. Successful experience in all ferrous and non-ferrous alloys essential. Box 12361.

Reps. to solicit Die work for Powdered Metal and Plastic Gears. Facilities for all size Gear Dies and segments. Excellent territories opened. Replies confidential. Box 12461.

DIE CAST FOREMAN — LOS ANGELES AREA

Nationally known corporation has immediate need for supervisor to direct aluminum die casting department including heat treating, metal finishing and trimming. Must have minimum of five years supervisory experience in similar operation. Company will assume relocation expenses. Box 12161.

EQUIPMENT

Complete Die Cast Shop For Sale or Lease in Cleveland Area.
2—Electrically controlled 400 Ton Zinc machines with convertible ends.
4—Punch Presses
8—Drill Presses
1—Lift Truck
1—Tumbler
1—Bridgeport
1—16" Lathe
BOX 12561.

FOR SALE
1 Clev. Die Cast Machine 400 T.
1 Cast Master 400 T Zinc & Al Machine
BOX 12661.

WANTED: 1—500 ton. Al, 1—500 ton Zn and 1—400 ton Zn die casting machines. State make, age, condition, location, price and if operating or idle. Also Al and Zn remelt and holding furnaces and trim presses. Box 12261.

FOR SALE — KUX MODEL HP-40
DIE CASTING MACHINE
600 TON ALUMINUM
PLATENS 41" x 56"

can be seen in actual operation in shop producing Aluminum Die Castings. Recently rebuilt with new hydraulic components, shot intensifier, core pull valves, hydraulic ejection, 18" stroke. Excellent condition. Can be purchased at —

20% OF NEW COST
AMERICAN DIE CASTING MACHINERY CO.
1744 W. Winona St. Chicago 40, Ill.
Ph: LO 1-7118-9

PUBLIC AUCTION SALE
THURSDAY, DEC. 14, 10:30 AM
at Crowley Division
1 Central Avenue, West Orange, New Jersey

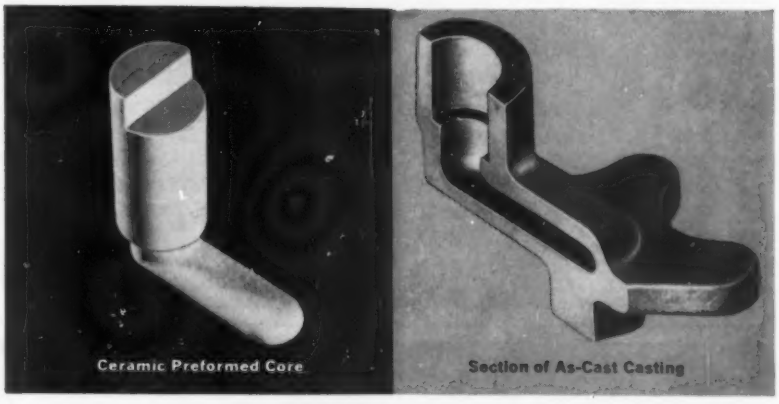
TABLET AND PREFORM PRESSES: (52) Stokes, Kux, Colton, 4 ton to 150 ton, single punch and rotary, single and dual pressure types, including: Stokes R4, R, T, F, DDS2, etc. Kux 82, 74, 65, 64, 54, 52. 800 Ton Baldwin-Southwark Hydraulic Hobbing Press.

EXTRUSION PRESSES: (3) 225 Ton Baldwin-Southwark and Watson Stillman horizontal hydraulic, vacuum head.

BLENDING and MIXING EQUIPMENT: Cowles dissolvers, double arm sigma blade mixers, ribbon blenders, Simpson muller mix-

more on next page

Eliminates Internal Machining . . . Increases Casting Yields



SHERWOOD Ceramic Preformed Cores Assure Smooth Internal Surfaces; Close-Tolerance Intricate Passages

This stabilized Sherwood core, inspected for accuracy and surface uniformity, solved a problem inherent in blind-hole design and production. The length and configuration of the small passage made conventional processing impossible. The manufacturer produced this casting without internal blisters, voids or other defects. Although the production run was small, the yield was 100% —proof of the reliability of Sherwood preformed ceramic cores for intricate design application.

- Hold internal tolerances within ±.005" or closer depending on size or configuration
- Produce as-cast internal surfaces of 100 RMS or better
- Permit pouring temperatures in excess of 3000°F
- Resist thermal shock without warping or fracture
- Eliminate metal/core reaction with any alloy
- Assure complete design freedom in size or configuration

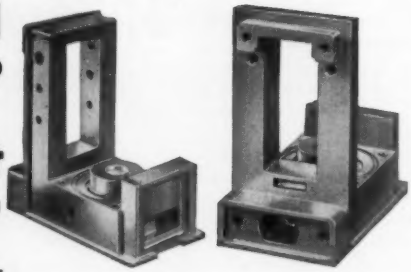
Send today for free technical design data!

Sherwood Refractories
Division of H. J. Sherwood, Inc.
16601 Euclid Avenue • Cleveland 12, Ohio

Circle No. 63 on Reader Service Card

Circle No. 41 on Reader Service Card

Dimensional Accuracy? YES... but Other 'Specs' are Equally Exacting!



Two views of zinc die-cast body for Air Controlled Timing Valve.

In addition to exacting dimensional tolerances, users of die castings often require other equally precise specifications to be met. For example, in the zinc die-cast body for the Air Controlled Timing Valve pictured, the following requirements were specified to insure successful assembly and functioning: absolute *solidity* and *high density* of the zinc alloy to prevent air leakage — along with a cast-in diaphragm surface absolutely smooth and free from imperfections; bottom of rectangular hole free from burrs; all plane surfaces flat and either parallel or square to one another.

Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

Milwaukee has been meeting exacting requirements like these for more than a half century!

MILWAUKEE DIE CASTING COMPANY

4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN

Established 1909

EQUIPMENT

ers, Gruendler mixer, Paterson conical blender, mixing tanks, tumbling barrels.

CRUSHING and PULVERIZING EQUIPMENT: Lancaster crusher, stainless steel Fitzmills, Stokes granulators, Stokes and Abbe steel lined ball mills up to 5' x 6', Stokes tornado mill, Hammermills, Gruendler crusher, Stokes jacketed vacuum ball mill, vibrating screens, sifters.

FURNACES, KILNS, DRYERS, OVENS: Buflovac twin drum stainless steel rotary dryer, 36 cu. ft. Steiner Ives Ovens, Allied 64 ft. car type continuous gas furnace, American Gas 20' x 3', 6' x 2', and 9' x 15" horizontal rotary kilns, melting furnaces, gas blowers, heat treating furnaces, rotary indexing furnaces 24 ft. diameter, all sizes ovens.

LABORATORY EQUIPMENT: Complete inspection and testing machines, Baldwin-Southwark 300,000 lb. tensile and compression tester, lab presses, balancers, scales, moisture testers, vibrators, electronic testers, etc. Complete Tool, Die, Mold Machine Shop. Maintenance Dept. Air Compressors. Material Handling Equipment. Tools & Dies for Powdered Metallurgy Parts.

Send for descriptive catalog:

INDUSTRIAL PLANTS CORP.
90 West Broadway
New York 7, New York
Phone: BArclay 7-4184

Designers And Builders Of Die Casting Dies Exclusively

JOB WORK FOR HYDROTELS

•

PHONE PRescott 8-2200

SUPREME IMPRESSION & MOLD CO., INC.

23080 GROESBECK HIGHWAY • WARREN, MICHIGAN

Circle No. 52 on Reader Service Card

THIS TRIGGER is your control over mold cavity surfaces - cleans, cools, lubricates in *ONE OPERATION*

SELF-AGITATING LUBRICANT CONTAINER

Get more *usable* castings with the P-W SYSTEM—universally accepted throughout the die casting industry.

GUN UNITS AVAILABLE SEPARATELY

Write for additional information to

PIERCE-WALLER, INC.

KETTERING P. O. Box 2121
DAYTON 29, OHIO

Circle No. 46 on Reader Service Card

PMM

book reviews

C. R. C. Standard Mathematical Tables *Charles D. Hodgman, editor-in-chief; Chemical Rubber Publishing Co., Cleveland, 1959. 525 pages. $4.00*

If the term "mathematical tables" makes you think of the usual compilation of logarithms, squares, cubes, and trigonometric functions, this book will be a surprise. It contains all the material ordinarily found in math tables. But in addition it is a good review of much of the math to which engineers and designs have recourse. It includes tables of integrals, covers Laplace and Fourier transforms, differential equations, the algebra of sets, integral domains, groups, fields and rings, vector analysis, and statistics.

The book also contains one item of interest, but of dubious value. In a discussion of mathematical reasoning in the preface, π is given to 110 places.

Tool Steel Simplified *Frank R. Palmer and George V. Luerssen; The Carpenter Steel Company. Reading, Pa., 1960. 595 pages. $2.50*

The authors say that the fundamental purpose of this book is to present simplified methods for selecting and heat treating the proper tool steel to make any kind of tool. It is written especially for men who design, make, and heat treat tools and dies.

This book was first printed in 1937, revised in 1948, and has been up-dated again by the original authors. New material has been added to advise the tool and die maker on hot work steels and air hardening steels.

The chapter on high speed steels has been rewritten to fit the changeover from tungsten high speed steels to the molybdenum types. It also covers changes in recognized industry practices.

Circle No. 19 on Reader Service Card

METAL POWDERS

TITANIUM

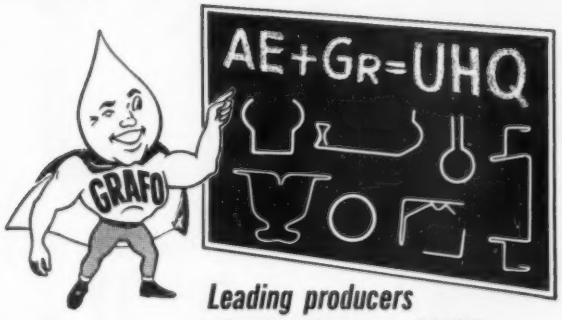
also

CHROMIUM - TITANIUM
COPPER - TITANIUM
CARBURIZED TITANIUM
etc.

for
Chemical-Resistant
and
Wear Resistant
Parts

Rare Metals Division
Consolidated Astronautics inc
38-15 30TH STREET
LONG ISLAND CITY 1, NEW YORK

Happy answer to a problem!



Leading producers of extrusions use GRAFO

Many manufacturers of aluminum extrusions already know the basic answer. It's simply this: *Aluminum Extruding* plus *GRAFO* equals *Uniformly High Quality!*

Why? Because GRAFO Colloidal Graphite dispersed in water reduces die wear, prevents sticking, gives better metal flow and improved production. *Send for handy Application Chart.*

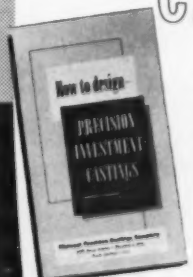
•If you have a problem of excessive temperatures, pressures or abrasion, let us help you solve it with a GRAFO Water, Oil or Alcohol Dispersion for your conditions.

GRAFO COLLOIDS *Corporation*
289 Wilkes Place, Sharon, Pa.

Circle No. 24 on Reader Service Card

FREE!

"HOW TO DESIGN— INVESTMENT CASTINGS"



● Send for this valuable book, now in its third edition, published by Midwest Precision which has an enviable background of many years in the field.

On every casting job submitted, our engineers and technicians make available to YOU, without obligation, their full store of accumulated precision casting knowledge.

To be sure of your investment cast parts, submit them to Midwest for a completely unbiased evaluation and recommendations.

MIDWEST PRECISION CASTINGS CO.
10703-13 QUINCY • CLEVELAND 6, OHIO
GArfield 1-1918 A-3314

Circle No. 40 on Reader Service Card

PMM index of advertisers

A

Acheson Colloids Co. 68
Advance Tool & Die Casting Co. ... 54
Alan Wood Steel Co. 23
Allegheny Ludlum Steel Corp. 15, 16, 17, 18
Aluminum Smelting & Refining Co. ..... Cov. II
American Smelting & Refining Co. Federated Metals Div. 11
American Smelting & Refining Co. Levelmax 49
American Zinc Sales Co. 20
Apex Smelting Co. ..... Cov. IV
Arwood Corp. 10
Atlantic Casting & Engineering Corp. 66
Auto Diesel Piston Ring Co., The ... 6

B

B & T Machinery Co. 37

C

Donald Carroll Metals, Inc. 67
Casting Engineers, Inc. 42
Cast-Master, H-P-M Div. 1
Cast-O-Matic Corp. 50
Celanese Corp. of America 12, 13
Certified Alloys Co. ..... Cov. II
Consolidated Astronautics, Inc. 71
Consolidated Mining & Smelting Co. of Canada, Ltd. 5
Cratex Manufacturing Co., Inc. 54

D

D-M-E Corp. 22
Joseph Dixon Crucible Co., The ..52, 53

E

E.M.B. Co., Ltd. 45
Ettco Tool & Machine Co. 54

G

Grafo Colloids Corp. 71
Gries Reproducer Corp. 65

H

Hammond Machinery Builders, Inc. ... 55
C. I. Hayes, Inc. 67
Heatbath Corp. 50
Hevi-Duty Electric Co. 19
Hitchiner Manufacturing Co. 6
Hoeganaes Sponge Iron Corp. 62
Hoover Co., The ..... Cov. III
H-P-M Div., Koehring Co. 1

I

International Minerals & Metals Corp. 72

K

Kux Machine Co. 56

L

Latrobe Die Casting Co. 4

M

Magna Manufacturing Co., Inc. 50
Micro Metals Corp. 65
Midwest Precision Castings Co. 71
Milwaukee Die Casting Co. 70
Mt. Vernon Die Casting Corp. 7

N

National Lead Co., Doehler-Jarvis Div. 40
New England Die Casting Co. 24
New Jersey Zinc Co., The 60, 61

O

Olin Aluminum 2

P

Pierce-Waller, Inc. 70

R

Reese Metal Products Corp. 65

S

St. Joseph Lead Co. 64
Alex. Saunders & Co., Inc. 66
H. J. Sherwood, Inc. 69
F. J. Stokes Corp. 46
Superior Industries, Inc. 58
Supreme Impression & Mold Co., Inc. 70

T

Tiffin Foundry, Inc., The 38
A. Triulzi 43

U

Union Steel Products Co. 51

V

Vascoloy-Ramet Corp. 8

W

West Instrument Corp. 63
Withrow Die Casting Co. 66

HUDSON BAY

SLAB ZINC 99.99+%

A QUALITY PRODUCT WHICH MEETS THE MOST EXACTING REQUIREMENTS OF THE DIE CASTING INDUSTRY

INTERNATIONAL MINERALS and METALS CORPORATION

11 BROADWAY • NEW YORK 4, N.Y.

Circle No. 34 on Reader Service Card

If it's service you're after..

call a Hoover Man

If you want the kind of service featured in this cartoon, we aren't making any promises. But if you want service in quality aluminum and zinc alloy castings, you'll come to the right place if you come to Hoover. We've been satisfying the die-casting demands of many different industries for 35 years. Let one of our Sales Engineers tell you about us. Why not today?

HOOVER

THE HOOVER COMPANY, Die Casting Division, North Canton, Ohio Die Casting specialists since 1922

In Canada — Hamilton, Ontario

DIE CASTING *by* HOOVER

Circle No. **32** on Reader Service Card

APEX SMELTING COMPANY ANNOUNCES THE MOST SIGNIFICANT ALLOY DEVELOPMENT IN ITS 38-YEAR HISTORY

Aluminum Alloys for die casters now part of Allcast line

For years Allcast 70, developed by Apex laboratories, has been the alloy that sand and permanent mold foundries prefer for their difficult jobs to achieve consistently high fluidity, absence of shrinkage, pressure tightness and a consequent high yield with a minimum of rejected castings.

Recognizing that die casters, too, had need of an alloy possessing not only these characteristics, but also offering minimum sludging and soldering, Apex's technical staff experimented with a variety of alloy heats and additives. Yet, after hundreds of tests, the elusive goal of consistent results had still not been achieved.

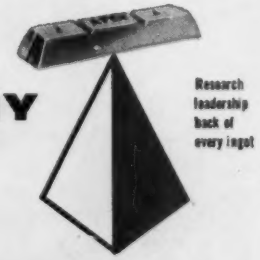
Then, early this year, Apex's technical staff was elated to hit upon new refining and alloying procedures that held promise of yielding the desired results.

Would the resulting alloy stand up under "tough job" conditions in the field? To get the answer, Apex enlisted the help of a number of its die casting customers and asked them to put the new alloy to the test. With shipment after shipment, on a consistent basis, these customers reported obtaining benefits such as these:

Increased fluidity
Minimum sludge formation
Less porosity and cold flows
Less lubricant required
Less tendency to solder
More shots per hour
Lower casting temperatures
Extended die life
Brighter surface finish
Better machinability
Greater pressure tightness

Though the new alloy appeared assured of acceptance, another big obstacle to practical adoption still remained—the substantially higher production costs of the new refining and alloying procedures. It remained for the Apex executive committee to resolve this problem by authorizing the expenditure of up to a million dollars for plant modernization and new equipment whose greater efficiency is expected to offset the increased costs. At the same time, the executive committee authorized immediate adoption of the new procedures, with Apex absorbing the higher costs.

Apex Allcast aluminum die cast alloys, prepared in conformance with standard or custom specifications, are now available at Apex's Chicago, Cleveland and Los Angeles plants.



Research leadership back of every ingot

APEX SMELTING COMPANY

Chicago 12 • Cleveland 5 • Long Beach 10, California
Springfield, Oregon (National Metallurgical Corp.)

Circle No. 10 on Reader Service Card